GAS JOURNAL

LIGHT · HEAT · POWER · BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Central 6055. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXXVII, No. 3323.] WEDNESDAY, JANUARY 26, 1927. [79TH YEAR

EDITORIAL NOTES.

Foreign Coals in the Retort-House.

THE responsible officers of gas undertakings are busy clearing up the debris of the great coal stoppage, the principal component of which is the financial burden. The public only know casually or superficially the great stress and strain to which the industry was subjected in order to maintain the supply of light, heat, and power for them during those seven months of unprecedented experiences. They know nothing of the struggles and trials which went on behind the scenes—in offices and retort-houses—to preserve the service for them. Never has the industry been put to a similar test; but it was not found wanting. Every gas administrator and gas engineer and all working for them knew the difficulties they had to meet to carry out their obligations to the community; but they dealt with them in a manner which was beyond all praise. Notwithstanding that knowledge, it will be valuable to have on record, both for technical and historical purposes, an account of what had to be encountered in the production of gas through having to work from old stocks of coal, a miscellaneous collection of material obtained from here and there, and coals from all parts of the world. It may be that experiences, through circumstances connected with the diverse character of the material itself, may not have been precisely the same in all cases; but an article which Dr. Geoffrey Weyman has contributed to this week's "JOURNAL," with the consent of the Chief Engineer of the Newcastle-upon-Tyne Gas Company (Mr. Frank Tarratt), may, we think, be taken fairly to portray general experiences. The information may possibly be a guide in the years to come, when circumstances (if ever they arise, which we hope will not be the case) compel recourse to the importation of coals from other lands, to help to tide this country over another similar emergency.

It will be seen from the article that, during the seven months, the Newcastle Company had experience with stocks of coal which had been accumulating since the strikes of 1921, and some of which was therefore five years old; with outcrop, heap, drift, and landsale coals; European coals—Silesian, Westphalian, Czecho-Slovakian, and American coals, including Youghiogheny, Westmorland, Roda, and Fairmont. For most of these coals, Dr. Weyman gives in tabulated form particulars as to moisture, volatile matter, and ash content, together with quantitative and thermal yields of gas per ton, the quantity of coke, and other information. These data were obtained with the help of a testing plant such as was described in the "JOURNAL" for March 17 last year (p. 677). This plant, he tells us, proved of the greatest assistance not only in determining the value of the coals, but in supplying a guide for practical working, which was followed with marked success. An interesting point arises in connection with the use of the stocked coal. In the old days when working was on the volumetric basis, there was a good deal of empirical attestation that coal did not depreciate to any material extent by being kept in stock; but now that we are on the therm basis, which gives greater refinement in the assessment of value, we find that the old view is negatived to a substantial degree. It must be admitted that much of the coal at Newcastle had been in stock for a long time; but this rather accentuates the point that there is a progressive depreciation, which represents a considerable aggregate in money value. There cannot be a loss per ton of coal of five or six therms, which are saleable at a given price per therm, without a heavy total financial loss. The data show that, through stocking, there was an increase in the moisture content; the proportion of smalls became larger, owing to the additional handling and weathering conditions; there was a weakening of coking properties; and in many cases, where the thermal yield was low, the hardness of the coke was substantially reduced, showing that serious depreciation of the coal substance had taken place. The effect of the weakening of the coke was found in the producer fires, and great trouble was experienced in maintaining retort temperatures. This was one of the inner bad experiences of the coal strike period, for the worries of the times were increased by the rubbishy coke produced from some of the European coals supplied to this country. With the British coals, it was found that the interior parts of both the uncovered and covered stocks showed greater disadvantage than the exterior; and this is attributed by Dr. Weyman to the higher average temperature existing in the interior of the heaps, and the consequent greater liability to oxidation. The data are convincing that, through the depreciation of stock compared with the original coal, a heavy price has to be paid in order to safeguard the gas service in times of industrial dispute. In this connection, a good argument can be advanced for the assistance, in such an emergency as that through which we have passed, of a diversity of gas-producing plant—particularly water-gas plant—which enables the prolongation of the period that a given stock of coal will last. Such provision of water-gas plant does not mean that the capital, like that for the coal stock, will remain idle during times of industrial peace. An indication of the extent to which carburetted water-gas plant was made use of during the coal stoppage is supplied by the fact that last year no less than 117,042,798 gallons of gas oil were brought into the country, as compared with 72,652,528 gallons in 1925—an increase of 44,390,270 gallons, or slightly over 61 p.ct.

When we come to the section of the article dealing with outcrop, heap, drift, and landsale coals, the data which Dr. Weyman gives (this applies also to the foreign coals) make interesting study. They indicate that a low ash and moisture content rank in importance with a high volatile content in obtaining a good yield of therms per ton of coal carbonized. Taking the table dealing with outcrop and other miscellaneous British coals, it is seen that it includes coals ranging in ash from 5·35 p.ct. to 34·8 p.ct.; volatile matter between 20·24 p.ct. and 38·61 p.ct.; and moisture between 1·81 p.ct. and 13·5 p.ct. The thermal production in this table appears to follow more consistently the differences in ash content than any other factor. For instance, take coals "H" and "I." "H" shows 8·50 p.ct. moisture, 31·9 p.ct. volatile matter, and 14·85 p.ct. ash. The therms per ton are 59. In the case of "I," we have a coal with 5 p.ct. more moisture, 3·19 p.ct. less volatile matter, and 2·82 less ash. Nevertheless, the therms are 63·4 per ton. "E" and "F" coals are also particularly notable in this regard.

In carbonizing, however, the coals were mixed so that the inferiorities of the one were to some extent neutralized by the better qualities of others.

While the gas industry is highly indebted to Continental coal sources for their assistance during the strike period (when any coals from which gas could be made were important), their supplies undoubtedly added much to the difficulties of working in the retort-house, where we are accustomed to qualities of British coals which produce a coke which does not give the trouble in the producers experienced with the cokes from European coals, and which does enable the heats to be maintained to a fairly uniform degree. Not so with these European coals. At the same time, they caused extremes to meet in the retort-house in a remarkable way. Non-coking coal and coking coal and coking duff presented themselves in an irritatingly confusing manner. But before the supplies of American coals grew to better dimensions, it was a matter of "Hobson's choice," and into the retorts the coal, whatever its character, had to go. The circumstances of the period were such that there was little opportunity for blending the coals in proper proportions so as to improve the coke.

Regarding these miscellaneous European coals, it is noticed from Dr. Weyman's article that many of them gave gas of so low a quality, even under test conditions, as to be below declared calorific value. Admixture with water gas could, therefore, only be accomplished with heavy expenditure of oil; but the public should be grateful that in such circumstances most gas undertakings managed to maintain a full quality for the town supply, although it was given to them by the Emergency Regulations to reduce it. Generally speaking, no good account can be given of Silesian coals. The gas production was poor in quality and quantity, and the coke would not hang together. From the Westphalian coals used at Newcastle, the quality of the gas was poor, and the carbonizing rate low. The coke yield was high, and the quality fine grained and very hard. But there were difficulties with it, particularly when poor coke from other coals was being used in the producers. When, however, the excellent coke from the Westphalian coal was passed into the producer fires, higher carbonizing heats were maintained, and improved returns resulted. The Czecho-Slovakian coal produced difficulties to an even greater extent than the Westphalian coal. We never remember a time in which retorting and heating conditions in British retort-houses were so chaotic, through the use of types of coal which were opposed to normal high standard working. The experiences will not be wanted again; but they would be faced cheerfully if the necessities of the nation demanded.

Coming to American coals, Dr. Weyman, in saying that it was an immense relief to use them, is reflecting the feelings of gas engineers throughout the country. At Newcastle, some half-a-dozen different types of American coals were used; but they more closely resembled South Yorkshire coals than the more strongly coking Durham coals. With them the rate of carbonization was high. Works accustomed to Durham coals carbonized the American varieties with remarkable ease, though works which normally deal with more easily carbonized coals, such as those from Yorkshire, no doubt found the American varieties somewhat troublesome. From them the gas yields were high, and the quality was good. The coke, though somewhat softer than that from high-class Durham coal, was quite strong enough for ordinary purposes. The tar yields were also excellent. The tabulated statement supplied in the article shows very different results from these coals compared with those which had to be worked earlier.

Towards the end of the article, Dr. Weyman draws certain conclusions from the experiences of Newcastle. In the first place, he submits that small coal is not suitable for normal gas-works plant. The coals used in future must contain a low percentage of ash. But if the coal is reduced in size in order to eliminate ash, our contributor asks, How are we going to deal with it? It would seem that the small coal will have to be blended or briquetted, or dealt with in chamber ovens or coking ovens. Another matter which obtrudes itself is uniformity. Part at any rate of the success obtained with American coals must be laid down to this feature. Normally, it is pointed out, there is a very wide variation in the coals dealt with, particularly by those works situated at or near the coalfields, and taking coal by rail. He also puts the pertinent question, Is it not possible to secure uniform and standard British gas coals? In any case, he submits it is evident that only properly prepared coals of the best type can compete in the open market with American gas coals.

We have to thank Dr. Weyman for a contribution to the history of the coal stoppage, from the standpoint of gas undertakings, which will have considerable current interest not only in this country but in others, and which will be referred to in the years to come by coal and gas technicians seeking information regarding the abnormal period of 1926.

Condemned by their Peers.

THE Executive Council of the Miners' Federation have been condemned by their peers in the trade union world. They could not have expected much else, though they tried hard to side-track coming to any decisive and direct vote, which they felt would seal finally and irrevocably the character for incompetence and misleading which they spread so lavishly before the world last year. Not that they seemed to care much for what the world thought of them. They rather delighted, without any delicate feelings over the means, in being in the limelight. But they did not want to become outcasts in the trade union world. What has been termed the "inquest" on the general strike of last year was held in the Central Hall, Westminster, on Thursday and Friday last week; and there were present no less than 1200 delegates representing all the trade unions affiliated to the Trade Union Congress. The report of the General Council which was before the delegates was a sweeping condemnation of the obstinate tactics of the Miners' Executive. The Samuel Memorandum (of which so much has been heard since last May) was regarded by the General Council as forming a satisfactory basis on which to reopen negotiations. The Miners' Executive viewed it otherwise, which convinced the "T.U.C." General Council that the miners were not prepared to consider anything which might cause any departure from their slogan. This being so, the General Council felt that the position was too grave to justify their being tied by a mere slogan; and therefore they rightly decided that the maximum advantage to the miners and the other trade unions was to be gained by terminating the general strike. That was the wisest thing which occurred in connection with that monstrous event. The General Council realized that they were responsible to the whole trade union movement, and not to any one section of it, and that section one which refused, in the critical circumstances, to budge towards anything of a constructive nature. Such a path of futility had no attractions for the General Council. In their criticism of the report of the General Council, the Miners' Executive postured as though the whole of the rank-and-file of the trade unions were on their side. If events have not disillusioned them before, then the vote last week must have helped to that desirable end. They have now been fairly judged by their peers, and condemned by the acceptance of the Council's report by 2,840,000 votes, as against 1,095,000—a majority in favour of 1,745,000. Moreover, the minority vote includes the whole body of miners, a large proportion of whom are not prepared to-day to own any allegiance to the "Red" Secretary of the Miners' Federation and his Executive puppets. Some districts are now contemplating having their own organizations. Yet in face of all this, the bombastic Cook avers the fight is not yet over, and that he and others are going to devote their days and energies to stirring up renewed strife. Now is the time for the leaders of the trade unions who realize that constructive work is for the good of industry generally—including the conditions of the workers and maximum employment—to set themselves sternly to oppose the avowed destructive strategy of such men as the revolutionary Secretary of the Miners' Federation. They must not sit now with folded arms, thankful that 1926 is over. There is other work to be done, and that is to preserve peace and operate in the best

interests of the workers; and their "best interests" are inseparable from those of industry. To follow again the direction-posts set up by the Minority Movement would mean irretrievable loss for, and distintegration of, real trade unionism, which must be preserved.

The Flueless House.

A WARNING letter against the reactionary movement that is proceeding in connection with house building—especially the subsidized houses for the poorer section of the community—appeared in "The Times" last week from Mr. P. L. Waterhouse. The erection of flueless houses is defended, by those responsible, on the ground of building economy; but the truth of the matter is that they are being built—at any rate, in the main—by local authorities who administer electricity undertakings, and such "economy" building is regarded as offering the means of making a close preserve for electricity. The sacrifice of healthful conditions in such houses is a big price to pay for any structural saving effected; and it becomes a bigger price when it is realized that it means compulsory patronage of electricity for heating purposes, at a cost greater than that at which the same duty can be performed by other agents. There appears to be a callous indifference to these matters. There is much talk of labour-saving; there is no mention of the depreciation of healthful conditions for the tenants, and of the fact that, while there is only one saving in building expenditure, the tenant has to shoulder permanently a higher expenditure for necessary service, which it should be the function of local authorities to see is, while labour saving, the most economical, and at the same time a preservative of the health conditions of rooms. Mr. Waterhouse has no quarrel with those who wish to adapt electricity to all heating, cooking, and lighting purposes, though he recognizes that the charges for current must be first reduced to enable successful competition with coal and gas; but he submits it is unfair that the tenants of small houses should be forced to hire electric apparatus and use electric current by reason of the absence of facilities for other forms of heating. We are afraid the interests of the tenants in this matter have not so far disturbed the minds of those who are favourable to committing them to the bondage of electricity, and depriving them of the exercise of their own free wills as to the agent they shall employ.

By all means let there be a saving in building expenditure in connection with chimneys and fireplaces; but let this be by the provision of flues which can both ventilate and remove the products of combustion of a better and cheaper labour-saving agent. When this is done, it complies with the consideration which Mr. Waterhouse says is so often ignored, which is that the properly constructed chimney flue, with its regular up-draught, is in action day and night, with or without a fire, continuously changing and purifying the air of the room. This automatic method of ventilation disappears from the "all-electric" flueless house; and, in lieu thereof, there has to be an air brick or grating to accord with the by-laws pertaining to all rooms without fireplaces. Now anyone with even a smattering of physics must know that such a brick or grating is not the same thing as a flue; and Mr. Waterhouse gives good reasons why the superior method of ventilation should not be discarded, especially in the homes of poor people where often the sleeping and living space is in inverse ratio to the size of the family. The circumstances of life in such houses must not be overlooked.

Towards the close of his letter, Mr. Waterhouse deliberately says, "the flueless house is unhealthy, and should not be tolerated." The letter also includes a warning to the Ministry of Health. There is no doubt that if that Department encourages this form of building, it will very soon find itself in sharp opposition to the medical and sanitary authorities throughout the country. It has this matter before it—whether any effective steps have been taken to put an end to such types of houses, we have no knowledge. But the Department cannot ignore the fact that men of position in the architectural and medical world are strongly opposed to the degradation of wholesome conditions in the home. This is not advance; it is retrogression.

Calorific Value during the Coal Stoppage.

NOTWITHSTANDING the many difficulties presented in the way of obtaining suitable material for gas making during the coal stoppage, gas undertakings almost generally maintained the calorific value of their product to the prescribed standard. The fact reflects the utmost credit on the technical and works staffs of the undertakings. They did their share, though conditions were so hostile to the maintenance of the reputation of gas for constancy of supply. Looking at the returns of the Gas Referees (Prof. C. V. Boys, Mr. W. J. Atkinson Butterfield, and Dr. J. S. Haldane) for the last two quarters (which were the most critical for gas undertakings), it is seen that the Metropolitan and most Suburban Companies continued calorific qualities as though nothing out of the ordinary was opposing them. We see that the Gas Light and Coke Company, whose declared calorific power is 500 B.Th.U. gross, supplied in the first quarter gas of the average value of 501·3 B.Th.U., and in the second quarter 501·4 B.Th.U. The South Metropolitan Company, with a declared value of 560 B.Th.U., distributed in the first quarter gas of an average of 562·2 B.Th.U., and in the second quarter 562·8 B.Th.U. The Commercial Company, with a declared value of 475 B.Th.U., supplied in the first quarter gas of an average of 477·6 B.Th.U., and in the second quarter 478·9 B.Th.U. The South Suburban Company, with a declared value of 500 B.Th.U., supplied in the first quarter gas of an average value of 503·1, and in the second quarter 501·5 B.Th.U. The Tottenham Light, Heat, and Power Company, with a declared value of 500 B.Th.U., supplied in the first quarter gas of an average of 502·3, and in the second quarter 501·7. The Wandsworth Company, with a declared value of 470 B.Th.U., supplied in the first quarter gas of an average of 451·4, and in the second quarter 459·4. It should be said, however, that from Oct. 1 to Dec. 19 the Company supplied gas of an average of 457 B.Th.U., and, after Dec. 19, 469·1 B.Th.U. The figures for all the companies, excepting Wandsworth, show how remarkably close to the declared value the average calorific value of gas now works out, which evidences a remarkable degree of control over manufacturing operations when this can be done during such difficult months as those of the past half-year. Of course, under the Emergency Regulations, gas undertakings could have worked to a lower figure than their declared values, had there been any advantage in doing so, or compulsion to do so. But as a matter of fact, there was no advantage in reducing B.Th.U. per c.ft. to effect economy during the period of emergency, inasmuch as it would not do to throw out of gear with the gas supplied all the apparatus in use on the district, and, whatever the quality, just as many heat units are required for performing a certain amount of work under given conditions. Moreover, now that the charge is on the thermal basis, no end of trouble would have arisen with the consumers in assessing their payments, had the calorific value per c.ft. descended to any appreciable degree below the declared value. We know from reports which have reached us that London, in respect of the maintenance of calorific values during the stoppage, only represents the performances in this regard of almost all undertakings of any position in the provinces.

Dessau Chambers and the Use of Waste Gases.

AN article in our German contemporary, of which we give a translation to-day, on twenty years' development of the Dessau system, supplies several points upon which British gas engineers will be induced to reflect in connection with their own practices. To say that this contribution is from the pen of Herr Ernst Körting is sufficient to ensure due attention to the submissions and data. Several matters are treated upon in the article; but we will here only emphasize two or three of them to illustrate the contained interest. To learn that the gas distributed by the concern of which Herr Körting is the Chief Engineer in Berlin is now of 440 B.Th.U. arrests notice; and, from what is said in the article, it leads to the conclusion that that thermal quality has been adopted with the view of conferring both economy and elasticity

upon the manufacturing operations. The principle which has been followed in making such a gas is to use as much of the coke production as possible, and so reduce coal requirements. The universal adoption of this formula would, Herr Körting submits, facilitate both coke sales and coal purchases. Moreover, the calorific value named enables the gas to be debenzolized. But Herr Körting does not say whether the benzole would be commercially of greater value if it remained in his gas than when extracted. Some gas undertakings in this country find, under the therm system, it is more profitable to leave the benzole in the gas. However, Herr Körting gives some figures to show that, from the commercial point of view, he is better off now in respect of coal purchases and the coke he has to dispose of than he was in 1910. He has less coal to handle, and less coke of which to dispose. But, of course, the whole of the improvement in economic conditions must not be ascribed to the lower thermal quality gas; but some credit, for at any rate coal saving and coke for fuel, must be accorded to the improvements which have been made in carbonizing plant. In 1910, the quantity of coal carbonized was 438,000 tons; in 1925, 292,000 tons. This is a reduction of 146,000 tons, or 33·3 p.ct., in the amount of coal that had to be purchased, although the gas made in 1925 was 147,400,000 cub.m., or 2,100,000 cub.m. less than in 1910. But the gas in 1925 was debenzolized; that in 1910, we take it, was not. The gas in 1910 was of 5250 calories; in 1925 4200 calories. This reduction in calorific value must not, in view of the debenzolization, be wholly placed against the manufacturing process, or the mixture of the coal gas with diluting water gas. Working out the figures, it is found that the gas made in 1910 was equal to 784,875 million calories, against 560,120 million in 1925, or a difference of 224,755 million calories, or 28 p.ct. (part of which was due to debenzolizing); but so far as the other part goes, it would be interesting to learn, had the gas been sold on a thermal and not a volumetric basis, what would have been the financial outcome if the figures given for 1910 and 1925 were both calculated out on the coal, coke and other products, and gas-therm values in 1925. However, per cubic metre, the reduction in calories is equivalent to 20 p.ct. But Herr Körting says that the lower calorific value in 1925 was compensated by the improvements in consumers' apparatus, and so resulted in no higher consumption—that is, volumetric consumption; so that, had the gas been sold on the therm basis, the improvements in apparatus should have inured to the monetary benefit of consumers to the extent of 20 p.ct. If the improvement in consumers' apparatus is fairly and universally represented by 20 p.ct. (which is the reduction in calorific value), then excellent progress in this respect has been made in the past sixteen years. This is not adverse criticism of the figures submitted by Herr Körting; but it is merely an endeavour to find out more exactly what they represent if translated into common money values—say, those existing in 1925.

In passing, it is noticed that Herr Körting submits that the lower the inerts in the coal gas, the greater can be the admixture with it of water gas. The question of specific gravity comes in; and it would be interesting to hear what Herr Körting has to say to the proposition of mixing a sufficient proportion of producer gas with coal gas to ensure a balance of specific gravity with water gas, in order that admixture of water gas can be made *ad lib* without upsetting density.

The next point which claims particular interest is that of heat economies in the setting. There is entire agreement with Herr Körting that as much as possible of the available heat should be used directly for carbonization and gasification—this being the primary purpose of the provision of heat. There can be no contention over the dictum that it is not true economy inefficiently to utilize heat in the setting, get a large amount of steam, and leave a considerable proportion of small coke (which could be used in the boiler-house) to be marketed at rubbish price, while good coke is fed into the producers. But he agrees that, in the cause of economy, heat leaving the setting should be recovered as much as possible for heating primary and secondary air, and for the production of steam by means of waste-heat boilers. And here he calls attention to a departure from the practice of passing for the production of steam the whole of the waste gases through the recuperator, and then on to the waste-heat boiler. This procedure entails the passage of more heat than is actually required for the preheating of the combustion air. In view of this, a suggestion made by Dr. Geipert has been adopted in the installation of Dessau vertical chambers at Schöneberg. By this the waste gases are divided on leaving the combustion chamber, and only such quantity travels to the recuperator as can be usefully employed; the balance going direct to the boiler. The theory upon which this division is based is that, if the whole of the waste gases passes through the recuperator to preheat the secondary air on the way, they reach the boiler at very much lower temperatures than those at which they leave the oven, as, in addition to giving up heat to the secondary air, they generally lose also through imperfections in the recuperator walls. The lower temperature of the waste gases means a larger and costlier boiler; and their considerably greater volume demands induced draught. By the modifications referred to, the surplus waste gases not required for preheating the secondary air are carried direct from the oven through a carefully insulated flue to the waste-heat boiler—the estimated proportions being 48 p.ct. for preheating the air, and 52 p.ct. for steam-raising. This ratio must, of course, be modified by circumstances—for instance, if preheating of the primary air is also desired. Objections have been raised to this system; but from Herr Körting's experience, they do not appear to have materialized. Indeed, he positively states that the method has satisfied all expectations, and that it possesses several advantages. For example, the portion of the waste gases going direct to the boiler can be readily protected against leakages of air from outside, and so it reaches the boiler at high temperatures; boiler efficiency is also improved; and capital and working costs of the boiler are reduced. This is a matter which will no doubt receive attention from gas engineers in this country, where, in some cases, the recuperator has been cut out altogether in favour of the waste-heat boiler.

At the end of his article, Herr Körting gives a number of data in tabulated form concerning the results he obtains with the Dessau vertical chamber ovens at Schöneberg. He realizes 87 therms per ton of coal carbonized, after extracting the benzole. After deducting coke for carbonization and water-gas production—(*a*) simultaneous and (*b*) with small coke retort charges—there remains 9·5 p.ct. of saleable coke for sale. The other figures in the table will receive careful investigation by our technical readers.

Fixing Gas-Coal Prices.

The question of the need for economic coal-selling prices was dealt with in an article, in the "Yorkshire Post" for Jan. 13, by Mr. A. W. Archer, Managing-Director of the South Kirkby, Featherstone, and Hemsworth Collieries. In the course of it, he stated that a meeting recently took place between representatives of certain gas-coal producing collieries and a Committee of the National Gas Council; the object of the coal owners being to urge the adoption of a correlated and fair policy with regard to the fixing of gas-coal prices. Mr. Archer proceeds as follows: "As the contracts are generally made half-yearly or yearly, a Committee representing owners and gas-works, it was suggested, should confer, take a fair view of the present and prospective economic situation, and try to agree on the extent to which prices should be advanced or reduced, without disturbing basis prices. In so far as in a spirit of accommodation a proposal of this kind could be given effect to, it would save endless price-cutting and ensure for the gas-works a fair deal. The gas industry of this country is a sheltered industry, and can afford to pay a reasonable price. But why should mineworkers be brought to the minimum wage because of the folly of collieries taking uneconomic prices? It would be no part of the right policy for collieries by combination to exploit the gas-works, nor have I ever heard it suggested. On occasions a similar practice to the one suggested has been adopted by collieries and railway companies. What is the objection to making it part of a standing arrangement?" It is noticed that no mention is made here of the

views which must have been expressed at the interview by the representatives of the National Gas Council; and, in all probability, then and there an answer was given to the question which concludes our extract from the article.

Foreign Gas Coal and Bank Borrowings.

In the comprehensive address which Mr. F. C. Goodenough delivered at the general meeting of the shareholders of Barclays Bank, Ltd., he referred to the increase in advances by the banks. Owing to the coal stoppage, it appears, many local authorities have found it necessary to borrow, in addition to their ordinary requirements, for the purpose of providing relief for the families of strikers and for unemployed persons, with the result that loans to customers have increased. Moreover, gas undertakings and many other industrial institutions using coal have had to purchase from abroad at very high prices; and as very few, if any, of these undertakings have been in a position to meet the extraordinary expenses out of revenue during the strike period, they have found it necessary to seek assistance from the banks. At the same time, notwithstanding the labour disputes, there has been considerable internal activity —notably in the building trade; and a large general demand for bank advances has arisen from that direction.

Coal Output.

In the week ended Jan. 8, the output of coal was 5,025,300 tons; and the number of persons employed was 966,700. The production averaged close upon 5·2 tons per person employed. The average is better in some areas than in others. This is the highest output in any week since the stoppage. Naturally it has taken time to get into full swing after the pits had been idle seven months.

Coal Imports.

There is still more coal from abroad to come into the country under contract. In December, 2,238,669 tons arrived, of a value of £5,843,521. This makes a total of 20,033,370 tons (valued at £43,020,554) for the eight months May to December. In addition, 1,071,406 tons of coke and briquettes were imported during the eight months, valued at £2,517,712. The imports month by month were as follows:

—	Tons	Value.
		£
May	3,618	5,983
June	600,634	966,280
July	2,319,657	4,147,995
August	3,970,442	7,542,847
September	3,940,880	7,749,101
October	3,489,083	7,721,940
November	3,467,921	9,037,254
December	2,238,669	5,843,521

The "Iron and Coal Trades Review" calculates that the average price of the coal imported in August was 38s. per ton, as against 35s. 9d. per ton in July. In September, the figure was 39s. 4d.; in October, 44s. 3¼d.; in November, 52s. 1⅞d.; and in December, 52s. 2¼d.

Electricity Board Chairman.

It was announced last week that Sir Andrew Rae Duncan has been appointed by the Government Chairman of the new Central Electricity Board. This important position he will hold for a period of not less than five years. We do not know that Sir Andrew has any particular electrical knowledge; but we are all aware of the splendid work he did as Coal Controller towards the end of the war period. Sir Andrew graduated at Glasgow University, has been both solicitor and barrister, and has had a wide experience in administration, the conciliation of conflicting interests, and the solution of difficult problems. He was Secretary of the Merchant Shipping Committee during the war, and Joint Secretary to the Admiralty Ship-building Council. After occupying the office of Coal Controller, he served on a number of important commissions. The duties of his new post will claim the full time of Sir Andrew.

Taxation Policy.

The Grand Council of the Federation of British Industries have been considering the policy to be pursued in approaching the Chancellor of the Exchequer before he finally decides upon his Budget. It is recognized by the Council that the Chancellor must inevitably be placed in a difficult position as the result of the protracted coal dispute, and that the losses consequent upon this will intensify his difficulties in balancing the Budget. Nevertheless, they are unanimously of opinion that, wherever the Chancellor may look for money, there should be no increase in direct taxation; but the loss to the revenue arising out of the coal stoppage should be regarded as a capital one to be spread over a term of years. They have also reaffirmed their constantly reiterated request for continued economy in the policy of administration of the nation. These recommendations will therefore form the main lines upon which the Federation will approach the Chancellor as soon as an interview can be arranged.

Duration of American Oil Supplies.

There have been various estimates made concerning the probable duration of the underground oil wealth of America at the current rate of consumption, and the likely increase in that rate. The "Petroleum Times" states that a new life computation has been made—this time by Messrs. Edward B. Smith & Co., who find that 25 years' supply is a very conservative estimate. As a matter of fact, they are of opinion that great possibilities exist for its future development, and on lines not thought of even five years ago. The industry in their view is apparently about to go through a reshuffling process, which has great promise for its future. To our mind, it is not a question of how long the supplies will hold out, but how long it will be before the Government of the United States, in view of the gradual exhaustion of the supply, see fit to prohibit further exports of the output in order to conserve it for the country itself. Should that happen, naturally it will be an advantage to other producing countries; but the restriction of the sources of supply will not benefit the consumers in other parts of the world.

PERSONAL.

Mr. M. H. TETLEY, M.I.Mech.E., has been appointed a Director of the Imperial Continental Gas Association, to fill the vacancy caused by the death of Mr. R. W. Wilson.

Col. Sir EDWARD ALLEN BROTHERTON, Bart., is gazetted as a Deputy-Lieutenant of the West Riding of Yorkshire and of the City and County of York. Col. Brotherton is one of the industrial magnates of the West Riding, and a former Member of Parliament for one of its Divisions—the City of Wakefield. He was the founder of the firm of Brotherton & Co., Ltd., ammonia and tar distillers, a Leeds concern having world-wide ramifications. Sir Edward's civic career has been almost as distinguished as his commercial career. He has filled the offices of Mayor of Wakefield and Lord Mayor of Leeds. He has been a great benefactor to both cities. It was largely through his influence that the 15th West Yorks. Regt. ("Leeds Pals")—of which he was appointed Hon. Colonel—was raised; and he bore the entire cost of its clothing and equipment.

The Right Hon. Sir ALFRED MOND, M.P., P.C., has been elected a member of the Society of Chemical Industry.

Mr. W. H. GIBBONS, Works Superintendent at the Coventry City Gas-Works, who is retiring after 48 years' service, has been presented with a bicycle and a silver flower stand by the employees at the works.

Mr. W. CHAFFER, the London Manager of Messrs. C. & W. Walker, Ltd., of Donnington, is retiring from active service on Jan. 31. Mr. Chaffer has been connected with the firm since 1883, and has been the London Manager since 1891. His friends in the South, the Eastern Counties, and the West of England wish him many years of leisure in his retirement.

Mr. JAMES RAILTON, of Messrs. Topham, Jones, & Railton, Public Works Contractors, has joined the Board of Stothert & Pitt, Ltd., of Bath.

OBITUARY.

The death occurred last Friday of Mr. JOSHUA FRENCH, Secretary for the last twenty years of the Easingwold Gas Light and Coke Company. Deceased, who was a native of Middleton-in-Teesdale, leaves a widow and daughter.

Mr. J. P. JONES, who since 1897 had been the North of England representative for Messrs. J. & W. B. Smith, Ltd., of Farringdon Road, E.C., died at his home, Limes Road, Tettenhall, Wolverhampton, on Dec. 16. Mr. Jones was nearly seventy years of age.

ELECTRICITY SUPPLY MEMORANDA.

THE "Electrical Review" recently, in a piece of absurdity which it published, said something which was not true concerning an Engineer who holds an honoured position in the gas industry. Had the statement been true, he would still have held an honoured position, but scientific men and professional colleagues would have eyed him somewhat askance—and wondered. Instead of doing this, they will probably now look askance at the "Electrical Review"—and wonder. The paragraph our contemporary published was as follows:

Musical Meters and an Apology.

Meters Sensitive to Music.

Users of gas will be exceedingly interested in a statement made recently by Mr. J. H. Canning, Engineer and Manager of the Newport Gas Company, at a meeting in Cardiff. He said that "certain tones in music affect the gases, when the meter is working, to a very marked degree," causing expansion. Even the back-firing of a gas engine, or the slamming of doors, might have some effect on correct registration; and he assured his hearers that in some cases it did so. We have heard of consumers having to pay for gas "to a pretty tune," but that, perhaps, is irrelevant; metrical expression, on the other hand, is the essence of poetry; and it might be worth while to recite a few verses in the cellar occasionally.

However, the "Review" is properly penitent, and in its issue for the 14th inst., the following appeared:

An Apology.

On p. 963 of the "Electrical Review" of Dec. 10 last, under the heading of "Meters Sensitive to Music," we quoted a statement alleged to have been made by Mr. J. H. Canning, the Engineer and Manager of the Newport (Mon.) Gas Company, which we now find was not made by him. We very much regret the annoyance which has been caused to Mr. Canning through the unfortunate error which was made in attributing to him remarks made by another speaker.

After this retraction and expression of regret, no further comment is necessary here. Readers will be able to apply, in quantity and form as best pleases them, their own comments to the original paragraph.

A Curious Leakage Effect.

The unfriendly attitude of electric wires towards gas-pipes in dwelling-houses has been the subject of notices in recent "Memoranda." Another interesting occurrence is related in a letter contributed to the "Electrical Times" by H. Bourne, of Hendon. He writes: "A complaint was received from a gas company's fitter that, when connecting a meter, he received a slight electrical shock when touching the house and service pipes simultaneously. The electric lighting installation was at once tested, and showed an insulation resistance of 2½ megohms to earth and to the house gas-pipe. The trouble disappeared when the main switch was put in the off position; but the shock was more noticeable as the electrical circuit was opened and closed at the main switch. A test taken between the house gas-pipe and earth showed a resistance of 100,000 ohms. On removing several floor boards, it was found that the electric-pipes were actually touching the gas-pipes in isolated places, and the two ran side by side under the one board for a considerable distance. There was not electrical continuity throughout the run of the electric-pipe work, as the system of connection was of the 'push-in' variety." Mr. Bourne mentions that, after the various lengths of electrical pipe had been bonded, and the whole connected to earth, the trouble disappeared. The system of supply is single-phase, 240 volts, 50 periods. The correspondent asks whether any one can offer suggestions as to the cause of this unusual occurrence.

Red Lead Jointed Gas-Pipes.

In the following issue of the "Electrical Times" "H. D. W." supplies what he conceives to be the explanation of the leakage effect referred to in the preceding paragraph. He thinks it is partly due to the insulating character of gas-pipe joints made with red lead. There must have been a slight leakage from the electric wire to the conduit. As the latter was not earthed, a megger would read high; and if the test to the gas-pipe was taken on a part separated by a socket joint from that where the shock was felt, the megger would likewise show a high reading. Obviously the house gas-pipe near the meter was at a potential higher than earth, due partly to the leak, and partly to contact between conduit and gas-pipe. Under this condition a shock would be felt between the house and service pipes; the latter being in direct contact with earth. When the conduit was bonded and earthed, as would be expected, the house gas-pipe was as good as earthed, and the trouble would disappear. The incident shows the necessity of bonding and earthing electric conduits. It also shows that gas and other pipes with red-lead socket joints are not metallically continuous, and that, when earthing (which should never be to a gas-pipe), care must be taken that the connection leads definitely to contact with the mass of earth.

Wiring Campaign.

The latest intelligence concerning the "Wiring of Britain's Homes Campaign" carries on the tale of activity in some quarters and apathy in others. The organizers appear to think they have a right to a universal response; but almost innumerable undertakings are of opinion that they are capable of conducting the promotion of business in their own ways, and at their own convenience. In one paper we read of campaign revival meetings being held in answer to the organizers' call for increased efforts. This suggests that enthusiasm is on the wane in some areas. What is described as a "mass" meeting of supply engineers and chairmen of local electricity committees was held in Manchester on Jan. 6; but it is stated that it was "poorly attended." "Mass" and "poorly attended" are not synonymous terms. It is mentioned that works meetings are being held in Lancashire and other areas. We suppose that at these the gospel of electricity is being preached. Other districts are urged to follow the good example. It reminds us of a feature of electioneering methods; but we do not think many employers would be willing to allow this sort of thing. In some places there is a lack of interest among the electricity undertakings; in others, among electrical contractors. It is difficult to get them to move as one body. The "apathy," and even suspicion, of the public is referred to. In one case, the issue of 14,000 circulars only secured an application for 200 of the competition booklets. On the other hand, 106 local circles have been formed for boosting electricity; but the ratio is low to the number of electricity undertakings. Where the campaign has taken on, demonstration houses have sprung-up like mushrooms. As did the seven months' coal stoppage, so the six months' "Wiring of Britain's Homes Campaign" bids fair to fizzle out. There is still another two months in which to get here and there fresh outbursts of animation to enliven the hearts of the promoters, who expected to see their plans taken up with energy North, South, East, and West, and in all the territory between.

All Electrically Lighted Streets.

In the several hundred electricity supply areas in the country, the "Electrical Times" has discovered thirty-three the streets of which are all electric lighted. They are Annfield Plain, Aylesbury, Basingstoke, Bedford, Brighton, Cheltenham, Chester, Cranbrook, Epsom, Erith, Fleetwood, Frant, Great Yarmouth, Hackney, Hampstead, Hawkhurst, Ilford, Maldon, Mexborough, Motherwell, Newton Abbot, Nuneaton, Paisley, Sale, Skelton and Brotton, Sunderland, Tenterden, Watford, Welwyn, Whitehaven, Willesden, Wimbledon, and Wishaw. Some of these places are not of much account; and the number of lamps cannot be great in them. We observe that "Meteor" has not accepted our invitation to say in which of these towns the electricity undertaking is run by the authority who light the roads, and are in competition with private gas enterprise. We have no doubt that in some of them, when electricity has declined to perform its functions, the inhabitants have had occasion to deplore their compulsory patronage of the electricity undertaking for street illumination. "Safety first" in public lighting is not in certain towns a feature of civic administration.

Electricity to Sweep the Field.

According to a report in an electrical paper, Mr. G. S. Haydon, the Resident Engineer of the North Wilford (Nottingham) Power Station, has delivered an address on "Electricity in the Home" to the Nottingham Society of Engineers. He thinks it is iniquitous that a charge of several pounds should be made, and paid in advance, before a supply of electricity can be made available. He also states that exhaustive tests by the Glasgow Corporation show that given (1) a comparable tariff, (2) free service connections, (3) hire or hire-purchase wiring of houses, fittings, and other household appliances, and (4) a real maintenance service, electricity would not only hold its own, but would eventually sweep the field. The statement illustrates—as does the assisted wiring system—the difficulties electricity has now to induce people to become patrons. We are not told, in the report before us, whether Mr. Haydon explained what is a "comparable tariff." But given all those things, we are assured by this prophetic gentleman that electricity will not only hold its own, but will eventually sweep the field. That is remarkable. The gas industry will perhaps consider whether it will struggle on with its ever-increasing load of business, in view of a prediction that electricity will eventually capture the lot. Perhaps Mr. Haydon in the quiet of his home will consider how much plant the electricity industry would require to supply the heat units distributed by the gas industry of this country on a cold

and foggy winter day. He should also study the data relating to the progress of the Glasgow Gas Department in all branches of the business; and perhaps, too, he will marvel at the big extensions that Glasgow is making to its gas-producing plant. What a waste! when Mr. Haydon declares that electricity will "eventually sweep the field." He is safe. As the years roll on, people may wonder more and more whether there was any time-limit to the term "eventually;" and the present-day prophets may not then be here to answer inquiries on the point.

Misbehaviour. Owing to a defect in a transformer, the electric light failed last Saturday week in the centre of Sheffield, and in the Crookesmoor district of the city. The breakdown lasted about twenty minutes. The reports make mention of the usual inconvenience to shopkeepers and the general public, and of the rush there was for candles. The candle makers must be deeply indebted to the constant vagaries of electricity. There was another failure at Ashby-de-la-Zouch on the 17th inst. It was the third in a week! While working an electric drill on the 14th inst., at his father's monument works, Philip Dakin (aged 45), of Matlock, received an electric shock which killed him instantly. A Newcastle paper reports that last Saturday week, Wilfred Henry, an electrician's labourer, lost his life at the Philadelphia power station. While fixing a lamp in the boiler house, he came in contact with a live wire. A man named John Joyce was also electrocuted recently, at the Redcar Steel Works, while engaged on an electric crane.

Electrified Protection. The question of whether the protection of property by placing wires round it and electrifying them is a man-trap or other engine calculated to destroy life or inflict grievous bodily harm is under legal consideration. A youth named Brynmor Edward John, age 18, an assistant collier, met his death by coming into contact with live wires round coal bunkers outside the power house at Penllwyngwent Colliery on Aug. 24. This is the property of Messrs. Cory Bros. & Co., Ltd., and they and Thomas Hardee (shift engineer), Temple Davies (power station engineer), and Robert Illingworth (electrical engineer), who are employed at Ogmore Vale Power Station, have been charged with the manslaughter of John. The first stage in the proceedings has been at the Bridgend Police Court; and the importance of the matter is shown by the fact that Mr. Artemus Jones, K.C., was retained by the prosecution (which was launched by the brother of the deceased through the South Wales Miners' Federation), and Sir Edward Marshall-Hall, K.C., for the defence. The prosecution was taken under the Offences Against Persons Act, 1861, and the Criminal Justice Act, 1825. It appears that instructions had been given to electrify the wire fence round the coal-bunkers between the hours of 5 p.m. and 7 a.m. It was alleged by the prosecution that, when the current was switched on, the voltage was 110; but the defence submitted that the fence was only connected with one wire, and it was only possible to get some 61 or 62 volts on the fence. The simple facts, according to the prosecution, are that John, with other companions, were out ratting; and the rat which was being chased ran towards the coal-bunkers. It appears that John's foot slipped on a piece of corrugated iron sheeting which was lying close to the fence, both feet gave way, and, as he fell forward, he gripped one of the wires with one hand, his other hand (so it was averred) resting on the corrugated iron sheeting. He finally collapsed on the wire. Mr. Artemus Jones said that death was no doubt instantaneous. Sir Edward's cross-examination of witnesses suggests that his view is that the youths were not there for ratting purposes, but for stealing coal. Sir Bernard Spilsbury was called. He gave the opinion that the cause of death was heart failure, due to the passage of electric current through the body. In forming this conclusion, he took into consideration the fact that the dead boy grasped the live wire, and could not be detached from it. The absence of burns on the body he attributes to an apparent low voltage. The effectiveness of the current, Sir Bernard said, depended upon the resistance, and the absence of burns would not negative electrocution. He admitted that fatalities from low voltage are very rare; and it is only if conditions of contact are good that fatalities are likely to occur. He has, however, found records of authoritative cases where a voltage of 63 had proved fatal, and there was an instance in Italy where the voltage was 45. He also said that unexpectedness of shock was a considerable factor in bringing about a fatal result. No comment can be made upon the case; all that at present need be said is that, as a result of the hearing at Bridgend, the defendants were committed for trial at the Assizes, bail being allowed each in the sum of £25.

Eastern Counties Gas Managers' Association.—The spring meeting of this Association will be held at Ipswich under the presidency of Mr. Frank Prentice, Engineer and Manager of the Ipswich Gas Light Company. The President has fixed the date of the meeting for Thursday, May 5.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Jan. 28.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. A. Hugh Seabrook on "Gas-Works and the Production of Light, Heat, and Power."

Feb. 2.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to Messrs. Crossley Bros., Ltd., of Manchester. Paper on "Lubrication," by Mr. F. N. Booth, of Rochdale.

Feb. 8.—NATIONAL GAS COUNCIL.—Meeting.

Feb. 8.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Feb. 10.—MIDLAND JUNIOR GAS ASSOCIATION.—Reunion and dinner at the Imperial Hotel, Birmingham.

Feb. 12.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the showrooms of the Gas Light and Coke Company.

Feb. 12.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Swansea.

Feb. 12.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Joint meeting with Eastern District at Glasgow. Paper by Mr. T. Campbell Finlayson on "The Importance of Flexibility in Gas Manufacture."

Feb. 16.—INSTITUTION OF GAS ENGINEERS AND BRITISH COMMERCIAL GAS ASSOCIATION.—Joint Conference on "The Inspection and Maintenance of Consumers' Appliances," at the Institution of Mechanical Engineers, Storey's Gate, S.W.1.

Feb. 17.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in Birmingham. Paper by Mr. Edgar Jones, of Derby, on "Drainage and Effluents from a Gas-Works."

Feb. 19.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Leeds. Paper by Mr. T. B. Browne, of the National Gas Engine Company, Ltd.

Feb. 25.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. E. W. L. Nicol, entitled "Coke's Case."

Feb. 26.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to Messrs. Pott, Cassels, & Williamson's Works, Motherwell.

March 9.—JUNIOR GAS ASSOCIATIONS.—Education Conference.

March 16.—BRITISH COMMERCIAL GAS ASSOCIATION.—Midlands District Conference at Smethwick.

April 8.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual spring meeting at Dumbarton.

May 5.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring meeting at Ipswich.

INSTITUTION OF GAS ENGINEERS.

Feb. 8.—Advisory Committee on Education.

Feb. 9.—Emergency Committee, Finance Committee, and Council Meeting.

June 14-17.—Annual General Meeting in London.

Midland Junior Gas Association.—The next meeting of the Association will be held at the works of Messrs. Crossley Bros., Ltd., Openshaw, Manchester, on Wednesday, Feb. 2. Inspection of the works will be followed by a paper on "Lubrication," by Mr. F. N. Booth, of Rochdale.

"S.B.G.I." Congratulates Sir David.—The following resolution was unanimously passed at the meeting of the Council of the Society of British Gas Industries on Jan. 21: "The members of the Council desire to express their great pleasure at the well-deserved honour conferred upon their esteemed Past-President, Sir David Milne Watson, by H.M. the King, and offer him their hearty congratulations and best wishes for many years of health and happiness."

Clairton (Pa.) Bye-Product Coke Plant.—Regarding the paragraph which appeared in our issue of Dec. 15 (p. 698) referring to the Clairton bye-product plant of the Carnegie Steel Company, the following amplification may be made. There are now 1134 ovens in operation, 768 of which are of the American Koppers type, while the 366 ovens recently put into operation are of the Becker type now built by the American Koppers Company. There are also 348 Becker ovens in course of erection at the present time.

Coal Stoppage and Coke Plant.—In the report on Labour in 1926, which has appeared in the "Labour Gazette," reference is made to the effect of the coal stoppage upon employment in various industries. Coke ovens and bye-product works were naturally seriously affected. The percentage rate of unemployment rose from 11·5 at April 25 to 50 at May 24; and it continued to rise until it reached 72·6 p.ct. at Oct. 25. There was a slight fall to 69·6 p.ct. at Nov. 22, while by Dec. 20 the figure had decreased to 39·9 p.ct. In this industry and also in iron-ore mining and pig-iron production, the percentage rate varied greatly in different districts. In some of the larger areas, it almost reached the maximum 100 p.ct. of the insured population.

GAS BILLS FOR 1927.

(*Concluded from p. 145.*)

SMETHWICK CORPORATION.

The main object of a Bill to be promoted by the Corporation is to extend the boundaries of the borough of Smethwick so as to include the urban district of Oldbury. The Oldbury Urban District Council are to be abolished, and all property and liabilities of the Council are to be transferred to the Corporation, as from April 1, 1928. The gas limits of the Corporation are to be extended so as to include the Oldbury District, with the exception of a portion within which the Birmingham Corporation are authorized to supply gas. No officer is to be entitled to receive compensation. There are a number of usual gas clauses in the Bill. The Corporation take power to sell or let on hire gas fittings, &c.; to specify size and material of pipes and fittings; and to compel repairs in case of danger. Power to enter premises to which a supply of gas is laid on is provided in the following section:

> The power to enter premises in order to inspect meters, fittings, and works for the supply of gas, and for the purpose of ascertaining the quantity of gas consumed or supplied, conferred upon the Corporation by section 21 of the Gas-Works Clauses Act, 1871, shall extend to premises in which there is any service pipe connected with the gas mains of the Corporation, except where the occupier of the premises shall have applied in writing to the Corporation for the disconnection of the service pipe from the mains of the Corporation.

There is power to provide showrooms and offices; and also to contract for the supply and purchase of gas in bulk—"provided that the Corporation shall not supply gas under any such contract beyond the gas limits if and so long as such supply would interfere with the supply of gas within those limits." There are many financial clauses; one being to enable the Corporation to provide reserve funds in connection with their trading concerns—in the case of the gas undertaking, not exceeding a sum equal to one-fifth of the aggregate capital expended for the time being by the Corporation upon that undertaking. Any of these funds may be used as working capital of the undertakings to which they specially relate, in which case the Corporation shall credit the fund from the revenue account of the undertaking with interest at the rate of 3½ p.ct. per annum during the period of use of the money.

[*Parliamentary Agents: Messrs. Sherwood & Co.*]

SOUTH STAFFORDSHIRE MOND GAS COMPANY.

Further powers are desired by the South Staffordshire Mond Gas Company, whose authorized capital is £1,000,000, in 100,000 shares of £10, up to one-half of which may be preference shares. There have been issued 33,966 ordinary shares (in addition to certain shares which were surrendered or cancelled after their issue), and 8250 6 p.ct. preference shares—all fully paid up. The Bill is to authorize the Company to divide the capital into shares of £1 each, and for other purposes. It is provided that the powers conferred upon the Company, by their Act of 1901, of manufacturing, selling, and dealing in bye-products or residual products of the gases manufactured by them shall, on scheduled lands, be extended to enable the Company:

> To work-up and convert all or any of the residual products and materials arising from, or in, or in connection with the manufacture of such gases or of any other gas manufactured by any other company, body, or person, or from, or in, or in connection with such working-up or conversion.
>
> To manufacture paints, preservatives, disinfectants, antiseptics, medicines for human beings and animals, and any other chemical compound or compounds of a like description, in the manufacture of which residual products arising from, or in, or in connection with the manufacture of gas by the Company or any other company, body, or person are not employed or the use of such products is subsidiary or ancillary, and to work-up or convert all or any of the residual products arising from, or in, or in connection with such manufacture.
>
> To purchase from or sell to any other company or any body or person any such residual products.
>
> To purchase or acquire from any source the materials required for such working-up and conversion or manufacture.
>
> To sell and deal in the products of such working-up, conversion, or manufacture.

Another section is to give the Company additional powers of manufacturing gases and chemical products on the lands scheduled; but nothing is to be construed as enlarging the powers of the Company of laying down mains or pipes in public streets or in private streets not belonging to them. Authority is also sought to invest in the shares, &c., of other companies which come within stipulated categories.

[*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

STOKE-ON-TRENT CORPORATION.

Previous to the passing of the Stoke-on-Trent (Gas Consolidation) Act of 1922, the city of Stoke-on-Trent and the parishes within the limits of supply created by that Act were furnished with gas from five stations, four of which, known as Longton, Stoke-upon-Trent, Fenton, and Burslem, belonged to the Corporation, while the fifth was the Staffordshire Potteries Station of the British Gas Light Company, Ltd. By that Act, however, the Corporation were empowered to purchase the last-named station, and after doing so to connect all the said undertakings with one another, and to amalgamate them or any two or more of them. In due course the Corporation purchased the Staffordshire Potteries Station, which included gas-works at Etruria, in the city, that had recently been rebuilt and extended; and in exercise of their powers they have connected-up therewith, and have ceased to manufacture gas at, the works forming part of their Stoke-upon-Trent undertaking and their Fenton undertaking. These three undertakings are thus now carried on as one; and the Corporation are now about to connect-up and amalgamate therewith the Longton undertaking. They also regard it as expedient that the Burslem undertaking (including the gas-works at Longport) should be similarly connected-up—the Corporation ceasing to manufacture gas at Longport. But the shortest convenient route for the pipes necessary for connecting the gas-works at Longport with those at Etruria passes through the urban district of Wolstanton United, which is not within the limits for the supply of gas by the Corporation; and therefore they have drafted a Bill to empower them to lay pipes along this route, and to acquire the necessary lands and easements. Estimates of the cost of the scheme amount to £14,500. A limit of three years is suggested for the compulsory purchase of lands and easements; and the period named for repayment of the amount involved in the carrying out of the scheme is twenty years, with five years for the cost of the Act.

[*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

WALLASEY CORPORATION

A heavy Bill (including nearly 200 sections) is being promoted to confer various powers upon the Wallasey Corporation. It is desired that the boundaries of the borough should be extended so as to include the township of Moreton and part of the township of Bidston-cum-Ford, with a similar extension of the limits for the supply of gas. The Birkenhead Corporation and the Hoylake Urban District Council are to sell to the Corporation the portions of their gas undertakings which are situated within the added areas, at a price to be settled by agreement or (failing that) by arbitration. There are some separate gas clauses, including one relating to the fitting-up of showrooms and offices.

[*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

WEST BROMWICH CORPORATION.

This is a Bill to extend the borough of West Bromwich so as to include part of the urban district of Perry Barr, and also the limits of gas supply to cover the added area—which added area "shall cease to be within the limits for the supply of gas of the Corporation of Birmingham." There is provision for the purchase by the West Bromwich Corporation from the Corporation of Birmingham (at a price to be fixed by arbitration, failing agreement) of all gas mains, pipes, and other works, belonging to them and situate within the added area. The period for repayment of any sum required for this purpose is placed at twenty years. Section 116 is to the effect that the Corporation may make and enforce by-laws requiring the provision of hearths in any house to be erected in the borough.

[*Parliamentary Agents: Messrs. R. W. Cooper & Sons.*]

Institution of Public Lighting Engineers.—The Hon. Secretary (Mr. W. J. Liberty) asks us to announce that the address of the Institution of Public Lighting Engineers is now: General Buildings, Aldwych, London, W.C. 2.

"Thermodynamics."—Messrs. Longmans, Green, & Co., Ltd., have published, at 15s. net, the Third Edition of Dr. Max Planck's "Treatise on Thermodynamics," translated by Alexander Ogg. This translation is from the Seventh German Edition of Dr. Planck's work. The book will be reviewed later in our columns.

Midland Junior Gas Association Dinner.—The Council of the Midland Junior Gas Association have arranged for a reunion and dinner, to take place at the Imperial Hotel, Birmingham, on Thursday, Feb. 10, and are confidently anticipating a large attendance. Mr. John Wilkinson (President of the Institution of Gas Engineers) has promised to be present. The Hon. Secretary (Mr. W. L. S. Spinks, Gas Department, Council House, Birmingham) will be pleased to receive applications for tickets from past members of the Association, who will no doubt welcome this opportunity of meeting old friends.

EXPERIENCES WITH AMERICAN AND OTHER COALS DURING THE MINERS' STRIKE, 1926.

By GEOFFREY WEYMAN.

The extraordinary and unanticipated success of the gas industry in maintaining an uninterrupted supply of gas during the seven months of the strike may be laid down to three factors: First, the firm and persistent determination of all concerned to maintain the supply; secondly, the large stocks of coal carried by the various gas undertakings, coupled with the full use of all existing water gas plant and extensive steaming of vertical retorts; and, thirdly, the importation of foreign coals. The first factor is most important. Without the extra work and thought given cheerfully, and as a matter of course, by all connected with the industry, it is certain that the interruption of an essential service would have seriously aggravated the national trouble. Those directly concerned in retort house work deserve the greatest credit for their efforts in facing the continual worry and trouble of dealing with the miscellaneous collection of coals which was carbonized.

In order to illustrate the remarks which will be made in respect to the coals used, results of tests (on a 1-100oth ton scale coal testing plant) will be quoted, by the courtesy of Mr. F. P. Tarratt, Engineer to the Newcastle-upon-Tyne and Gateshead Gas Company. The plant and method of operation have been described before.* It may be stated that this plant proved of the greatest assistance, not only in appreciating the value of the coals, but in forming a guide for the practical working which the works were able to follow with marked success.

STOCK COALS.

The huge stocks of coals held at the commencement of the strike were sufficient to carry on for two or three months, but actually lasted longer, owing to dilution of the coal gas with water gas, and the collection and admixture of odd lots of coals from outcrops, small collieries which continued working, pit heaps, and European coals. These stocks served their purpose in the fact that time was given to secure foreign coal; but the capital represented by the stocks was not only idle, but dwindling, for it soon became apparent that the coals taken from stock had deteriorated in carbonizing properties. Most of the coals had been accumulated following the strike of 1921, and thus had been standing up to five years. The quality of the gas yielded was lower than normal, while the yields dropped sometimes as much as 5 or 6 therms per ton below normal for the same class of coal. Coals from stocks in the open showed up to 6 p.ct. of moisture held, owing to the large proportion of smalls. The decrease of particle size was evidently due partly to the additional handling and partly to weathering influences.

Some stock coals did not show any weakening of the coking properties; but in many cases where the thermal yield was small the hardness of the coke was substantially reduced, showing that serious deterioration of the coal substance had taken place. Such coals, provided that the particle size was normal, would be expected to carbonize quickly; but any such tendency was more than counteracted by the fine duff and high moisture which was contained in them, and in practice the rate was actually slower. Deterioration of the coal substance was often marked by the breaking-down of the coke into small granular pieces; and when this happened in the producer fires, great trouble was found in maintaining retort temperatures. While in some cases deterioration might be traced to the inclusion of coals specially susceptible to atmospheric oxidation, a difference could usually be detected in coals drawn from the exterior and interior of large stock heaps respectively, particularly those under cover; the interior giving the worst results. This is no doubt due to the average higher temperature in the inside of heaps, and consequent greater liability to oxidation.

As an example of the deterioration which occurred, coal tests (in Table I.) may be quoted. Coal A is probably typical

TABLE I.—*Stock Coals.*

Coal.	Moisture, P.Ct	Gas Yield per Ton.			Coke.		Rate of Carbonizing. Standard = 50.
		C.Ft.	Cal. Val. B.Th.U. per C.Ft.	Therms.	Cwt. per Ton.	Hardness, P.Ct. Large.	
A	1·00	13,000	550	71·5	13·8	78	49
B	2 05	13,000	541	70·3	12·6	68	48 8
C	5·54	12,580	530	66·7	12·6	66	42
D	2·32	13,000	536	69·7	14·3	79	48
E	2·24	12,970	533	69·1	12·6	77	41·8

of the average original coals. Coal B represents a sample taken from an open stock when first brought into use. Coal C is from the interior of the same stock. Coals D and E are from the surface and the interior of a covered stock. Taking into account the interest on the capital represented by a three months' stock of coal, the depreciation of this stock, the value of the land (and buildings if any) which is occupied by such a stock spread at reasonable depth to avoid overheating, and the extra handling costs involved, it can be estimated that less than 50 p.ct. of the value of the coal will be realized when the stock is used. This seems a heavy price to pay as a safeguard against industrial disputes. Yet a three months' stock is not a sufficient safeguard when it has been shown that a seven months' emergency may arise.

There is here a very potent argument for extension in the use of carburetted water gas plants. By expending a portion of the capital on such gas generating plants, instead of on coal stocks, the equivalent of coal gas from the coal displaced is obtained in the form of water gas from the coke of the reduced coal stock. Moreover, the carburetted water gas plants need not remain idle like a coal stock, but can be used to advantage for purposes of dilution, of levelling-down the quality of the coal gas to the declared calorific value, and to tide over peak loads. Not only is it apparent that less capital expenditure is required, but the maintenance costs are reduced, and there is less risk of failure to meet an emergency.

OUTCROP, HEAP, DRIFT, AND LANDSALE COALS.

In addition to the coals brought in from small collieries situated mostly on the outskirts of the colliery districts, and which continued working, considerable amounts of coals from outcrops and drifts were carbonized. Some of these were good, while many others were practically worthless. As they were received in small quantities at a time, mixing was usually possible. Some of the smaller works relied entirely on such supplies. Typical tests of coals of this class are given in Table II. Coals A, B, and C are from small collieries normally

TABLE II.—*Landsale Drift, Outcrop, and Heap Coals.*

Coal.	Moisture, P.Ct	Volatile Matter, P.Ct.	Ash, P.Ct.	Gas per Ton.			Coke.		Rate of Carbonizing. Standard = 50.	Tar. Gallons per Ton.
				C.Ft.	Cal. Val. B.Th.U. per C.Ft.	Therms.	Cwt per Ton.	Hardness, P.Ct. Large.		
A	2·72	30·68	7·21	13,000	538	69 9	14·3	79	45	8·8
B	2·76	25·29	15·32	12,290	470	57 8	15·4	70	37	6·6
C	2·65	38·61	8·62	13,000	527	68 5	12·3	75	47	7·0
D	5·36	20 24	34·80	10,300	504	51 9	14 6	48	41	..
E	8·14	32·07	13·31	11,320	503	57·0	non-	coking	..	7·7
F	1 81	35·54	5·35	13,000	539	70·1	13·7	85	52	9·9
G	4·32	23·38	7·05	12,060	552	66·6	14 6	91	33	10 1
H	8 50	31·90	14·85	11,800	500	59·0	12·9	70	42	8·4
I	13·50	28·71	12 03	13,000	488	63·4	non-	coking	47	..

A, B, C—Landsale collieries. D, E, F—Outcrop and shallow drift coals. G, H, I—Colliery heap coals.

employed on landsale. Coals D, E, and F are outcrop and shallow drift coals. The extraordinary variation possible is exemplified in coals E and F, which came from drifts situated within a mile of each other. Coals from outcrops and drifts almost always contained some lump coal, which was a great advantage.

Coal conservation was realized by the fact that coals lying in heaps near the pits were put to good use. These heaps have generally been formed from the small coal for which a ready sale could not be found, and some were accumulated forty or more years ago. The older heaps contained the least ash; and it was found that one heap of several thousand tons contained as little as 3 or 4 p.ct. Other heaps contained up to 50 p.ct. or more. The coals G, H, and I are heap coals, which proved serviceable in the circumstances, although suffering from the disadvantage of very small size accompanied by heavy moisture, and if carbonized separately would have given the same troubles as were experienced with the European coals. Some heaps were non-coking, and others so weakly coking that the coke broke to small pieces on the producer fires, causing "blanketing," and necessitating extra labour to maintain the retort temperatures. The enthusiasm of the "getters" generally led to the inclusion of turf and other forms of vegetable matter which were particularly harmful to the weakly coking varieties.

EUROPEAN COALS.

It must be admitted that the European coals helped to spin-out existing stocks; but a crisis soon arose owing to their unfavourable gas-making qualities, and those concerns which were not able to mix-in stock coals fared badly. Little, if any, of the European coal could be called "gas coal." Extremes were presented. The coals from the Silesian source

* See "Modern Gas-Works Chemistry" and "JOURNAL," March 10, 1926, *et seq.*

were non-coking, while the Westphalian and Czecho-Slovakian were very strongly coking. The ludicrous effect of attempting to carbonize a non-coking coal can be imagined; but when this was followed by a coking duff the conditions in the retort house reached the limit.

It will be noticed that many of these coals gave gas of so low a quality, even under test conditions, as to be below common declared values. Admixture with water gas could only be accomplished with heavy expenditure of oil; and the public should be very grateful that, even in these circumstances, most of the gas undertakings managed to maintain the full quality of the town supply, although it was permissible to reduce the quality under the Emergency Regulations.

SILESIAN COALS.

The Silesian coals were practically non-coking. Although carbonizing with extreme rapidity, the gas was very poor in both quality and quantity. The "nuts" presented the greatest trouble, as when mixed with other coals there was no blending, and what would have been a good coke fell to pieces by reason of the "nuts." The coke from the Silesian smalls hung together just long enough to get into the producer fires, where, falling to pieces, it effectually blanketed the fires, and necessitated a practically complete removal of the fuel bed. The smalls could be mixed and blended more or less successfully with about four or five times the weight of coking coal, but obviously the circumstances were against blending.

WESTPHALIAN.

The coals from this district could be best described as "coking smalls," not very dissimilar from Durham "coking smalls." The moisture was high, the volatile matter low. The quality of the gas was poor, and the carbonizing rate very low. On the other hand, the coke yield was high, and the quality fine-grained and very hard. In the tests given in Table III., the high coke yield will be noted. The slow rate of carbonizing due to the viscous plastic layer caused much hanging and sticking in continuous vertical retorts—particularly if attempts were made to keep the gas quality up to normal by forcing the throughput. Steaming became ineffective, and gas output was naturally low. In horizontal retorts trouble was experienced in getting the wet small coal to travel to the charging machines. Charging then became more a matter of luck than of science or skill; and the heart of the expert chargeman was broken.

TABLE III.—*European Coals.*

Coal.	Moisture. P.Ct.	Volatile Matter. P.Ct.	Ash P.Ct	Gas per Ton. C.Ft.	Gas per Ton. Cal. Val. B.Th.U. per C.Ft.	Gas per Ton. Therms.	Coke. Cwt. per Ton.	Coke. Hardness, P.Ct. Large.	Rate of Carbonizing Standard = 50.	Tar, Gallons per Ton.
A	5·26	35·69	7·29	13,000	498	64·7	non-	coking	55	8·5
B	2·60	30·43	10·05	13,000	535	68·5	13·7	77	49	9·0
C	3·68	19·67	8·40	13,000	498	64·7	15·4	91	42	6·6
D	4·56	23·74	6·68	13,000	517	67·2	14·3	81	45	6·5
E	8·15	21·33	9·20	13,000	489	63·6	14·8	87	38	7·2
F	4·12	29·31	10·70	13,000	517	67·2	14·3	85	45	9·3
G	4·96	24·29	15·30	11,490	528	60·7	15·1	87	38	7·9

A—Silesian. B—Blend of 20 p.ct. Silesian, 80 p.ct. coking coal.
C, D—Westphalian. E, F, G—Czecho-Slovakian.

The results were consequently very poor—particularly when such coal was first charged and the producers were being fired with indifferent coke from some other coal. Later, when the excellent coke from the Westphalian coal got through the fires, higher carbonizing heats could be maintained, and improved returns resulted. The very high temperatures required to deal with such coal were unlikely to improve the life even of silica settings; and in many cases there must have been anxiety felt as to the effects on the settings.

CZECHO-SLOVAKIAN (OSTRAUER).

The difficulties experienced with the Westphalian coal applied to a greater extent with the coals from this source. The "small" coal (Test E) was very small—in fact, it would be called "duff" in this country. The unscreened (Test F) was mostly of the size of coking small, with an occasional lump. The later consignments (Test G) were even worse, and showed very high ash contents and low gas-making qualities.

The trouble with handling the fine wet coal became accentuated. Uneven charging in horizontal retorts and hanging-up in verticals produced all the known ill-effects, and there is no need to recite them. The coke, when the coal was fully carbonized, was excellent, and of great service in the water gas plants; but it was decidedly heavier than ordinary gas coke, and needed, perhaps, more draught than could be given in producers and fires not designed for a coke of this type. Given the draught, a very hot fire resulted, with tendency to clinker, although the melting point of the ash was fairly high.

For several reasons, it was found best to carbonize this coal alone, rather than attempt to mix it. In the first place, it was fatal to have retorts in the same setting charged with this and other coals. If this coke followed a poor coke, the heats dropped until more draught was given, when the whole fire clinkered badly. On the other hand, when followed by an indifferent coke "blanketing" was almost sure to happen. Carbonized by themselves, when conditions could be to some extent adjusted, and given plenty of time, the results were not quite so bad. To those not accustomed to deal with such highly coking coals, the Westphalian and Czecho-Slovakian varieties must have been a nightmare.

AMERICAN COALS.

The relief experienced when the first consignments of American coal proved up to expectations was immense. Most of the coals imported were unscreened Kanawha gas coal, but Westmorland, Youghiogheny, Fairmont, Roda, and Elkhorn were also used. In type these coals more closely resembled the South Yorkshire coals than the more strongly coking Durham coals. They are characterized by having a high rate of carbonization. This feature, which is the most important property of gas coals, was in striking contrast to the European coals dealt with, and even to most Durham coals. Thus a works accustomed to Durham coals carbonized the American coals with remarkable ease. Those works, however, which normally dealt with the more easily carbonized coals, such as those from Yorkshire, would find the American coals troublesome; and one such case is reported by Mr. Herbert Lees in his Presidential Address to the North of England Gas Managers' Association.*

A coal which allows of being quickly carbonized, and at the same time contains sufficient bituminous matter to give a coherent coke, can be relied upon for a good yield of high quality gas. The American coals gave a fair coke, which, although softer than that from good Durham coals, was quite strong enough for ordinary purposes. The gas yields were high, and the quality good; while the tar yields were also very good. No particular trouble was experienced with clinker, even in the water gas plants; the fires being on the hot side, as the coke was readily combustible. This might lead to formation of clinker from the ash of some previous coal.

TABLE IV.—*American Coals.*

Coal.	Moisture, P.Ct.	Volatile Matter, P.Ct.	Ash, P.Ct.	Gas per Ton. C.Ft.	Gas per Ton. Cal. Val. B.Th.U. per C.Ft.	Gas per Ton. Therms.	Coke. Cwt. per Ton.	Coke. Hardness, P.Ct. Large.	Rate of Carbonizing. Standard = 50.	Tar, Gallons per Ton.
A	1·78	34·91	9·08	13,000	589	76·6	13·4	75	52	11·4
B	1·90	35·50	8·30	13,000	563	73·2	13·8	80	54	11·0
C	2·15	35·35	10·85	13,000	545	70·8	14·0	78	50	11·2
D	1·86	35·57	4·64	13,000	578	75·1	14·3	79	57	11·5
E	1·75	35·36	4·65	13,000	558	72·5	14·1	82	58	11·2
F	2·18	39·66	7·90	13,000	533	69·3	13·7	81	49	10·5
G	2·42	37·58	5·60	13,000	564	73·3	13·7	81	49	9·9
H	5·98	17·69	7·30	13,000	500	65·0	16·0	87	40	6·0

A, B—Kanawha. C—Youghiogheny and Westmorland. D, E—Roda
F—Fairmont. G—Elkhorn. H—Coking coal.

An important feature was the uniformity; only one delivery appearing to contain a mixed lot of coals, some of which were of the coking type (Kanawha Marian). The best all-round test (A), and the average (B) of some 60 samples of Kanawha are in Table IV. It must be remembered that the test conditions have not been altered from those in vogue for dealing with Durham coals; and in some respects the American coals might have given better results with adjustment of conditions to suit this type of coal.

Youghiogheny and Westmorland.—These coals did not present any great difference from the Kanawha. The thermal yields were a little lower, and the coke yield larger and harder. The coals carbonized quickly in the first stages; but there was sometimes difficulty in driving out the last portion of the volatile matter, and charges were apt to be black cored. The ash was definitely higher.

Roda.—This coal proved the most successful all-round variety for gas-making purposes. The thermal yields were equal to any, and the rate of carbonization higher, although the coke was stronger and tar yield very good. The ash was remarkably low, varying from 3·7 to 6·8 p.ct., with an average of 4·65 p.ct.

Fairmont.—The results were not so good with this coal. This was the only variety with a sulphur content (about 3 p.ct.) sufficiently high to cause comment. It was noticed that the sulphur in the purified gas rose abnormally high while this coal was being carbonized.

Coking Coal.—Some coking coals were received in this

* See "JOURNAL," Oct. 13, 1926.

country, and may have found their way to gas-works. Test H shows what might have been expected from this class of coal, which, of course, is not suitable for ordinary gas-works use.

CONCLUSIONS.

Experience with different coals during the strike has laid emphasis on several issues; and it would be wise to give these serious consideration. At the last meeting of the Institution of Gas Engineers a good deal was said as to the effects of particle size on the carbonizing properties of coal. The strike has shown very clearly that small coal is not suitable for normal gas-works plant. It is realized that the coals used in the future must contain a low ash; but if the coal is reduced in size in order to eliminate the ash, how are we going to deal with it? It would seem that small coal will have to be blended and briquetted, or dealt with in chamber ovens or coke ovens.

Another matter which obtrudes itself is uniformity. A part, at any rate, of the success obtained with American coals must be laid to this feature. Normally there is a very wide variation in the coals dealt with, particularly by those works situated on or near the coal fields, and taking coal by rail. The extremes reached during the strike reduced retort houses to chaos. Is it not possible to secure uniform and standard British gas coals? In any case, it is evident that only properly prepared coals of the best type can compete on the open market with American gas coals.

THE DESSAU VERTICAL SYSTEM.

RESULTS OF TWENTY YEARS' DEVELOPMENTS.

By ERNST KÖRTING, of Berlin.

[From "Das Gas- und Wasserfach," Dec. 4, 1926.]

At the time of the hundredth anniversary of the German gas industry, Herr Körting considers it opportune for the gas engineer to take stock of the progress made with his own carbonizing problems. As far as the Berlin Gasbetriebsgesellschaft is concerned, of which he is Chief Engineer—as he was for its predecessors, the I.C.G.A.—the question resolves itself into a reiew of the Dessau vertical retort process, as it stands after twenty years' constructive development. The present article affords us an opportunity of giving some of the views of a carbonizing expert of the highest standing, and also provides interesting data for comparison with English systems.

GENERAL PRINCIPLES.

The test of any carbonizing system, says Herr Körting, is its ability to produce advantageously the quantities and quality of gas required. The gas distributed to-day by the Gasbetriebsgesellschaft is a mixture of coal gas and water gas of 4200 cal. [440 B.Th.U.]. The principle followed in manufacturing such a gas is to use as much of the coke production as possible for making water gas, a d so reduce coal requirements. A universal adoption of this formula would, it is pointed out, facilitate both coke sales and coal purchases. In this connection, a comparison of the years 1910 and 1925, in which the undertaking sold approximately equal volumes of gas, is very interesting.

—	Coal Carbonized.	Coke Sold.	Gas Made.	Cal. Val.
	Tons.	Tons.	Cub.M.	Calories.
1910	438,000	208,000	149,500,000	5250
1925	292,000	127,000	147,400,000*	4200
			*Debenzolized	

It is pointed out that the lower calorific value in the latter year was compensated by improvements in consumers' apparatus, and and so resulted in no higher consumption.

INERTS AND WATER GAS.

In considering how much water gas can be used in mixture with coal gas, a factor of great importance is the tightness of the retorts or chambers. The more inerts there are in the coal gas, the less water gas can be used. Taking the extreme case, with 25 p.ct. inerts, no water gas at all could be used. Had the 1925 gas had this proportion, 92,000 tons more coal would have been required for the make, and 86,000 tons, or an additional 70 p.ct., of coke would have had to be disposed of. In the matter of tightness, retorts are superior to chambers. Dessau vertical retort gas contains not more than 3 p.ct. of nitrogen, which compares with 6 to 8 p.ct. in the vertical chambers at Schöneberg, and considerably more in the inclined and horizontal chambers.

HEAT ECONOMICS.

Cheap and efficient carbonization depends to a great extent upon a favourable distribution of the heat in the settings. Herr Körting lays down two guiding principles. First, as much as possible of the heat developed from the coke in the producers must be made effective for the heating of the coal, and, in some cases, for the production of water gas. Within the limits of structural durability, this is accomplished the more effectively, the greater the temperature at which the combustion gases enter the oven, and the lower that at the exit into the recuperator. Secondly, the heat leaving the oven must be recovered as far as possible, by using it for preheating the primary (and secondary) air, and for the production of steam, leaving as little as possible to go to waste.

The more of the available heat that can be used directly for carbonization and gasification, the better it is. It is true that waste-heat boilers permit of the recovery of a good deal, but it is not genuine efficiency for very hot waste gases from the settings to produce so much steam that a large proportion of the small coke, which could have been used in the boiler house, has to be marketed at rubbish prices, while the producers are fed with high-grade coke. There is, says Herr Körting, an example of this taking place in a large English works, which he does not name. The rule, therefore, is that losses which are due to inefficient heat application in the settings can be compensated only to a very minor extent by means of waste-heat boilers.

DISTRIBUTION OF WASTE HEAT.

For the production of steam, the whole of the waste gases can, as is usual, be passed direct through the recuperator, and then to the waste-heat boiler. This procedure entails, however, the passage of more heat than is actually required for preheating the combustion air, for the waste gases contain more than it can possibly take up. For this reason, the arrangement shown in the diagrams, figs. 1 and 2, was adopted, at Dr. R. Geipert's suggestion, in the Dessau vertical chambers erected a few years ago at the Schöneberg Works. By this system, the waste fumes are divided on leaving the combustion chamber, and only such quantity passes to the recuperator as can be usefully employed there. The balance goes direct to the boiler. The theory was worked out as follows. It was estimated that the waste gases leave the oven at a temperature of 1000° C., and that the exchange of heat in the recuperator raises the secondary air to 750°. The estimate is facilitated by assuming that the producer coke contains nothing combustible except the carbon, so that only the theoretical quantity of air is required. Assuming the dry producer gas to contain

$$0{\cdot}05 \text{ cub.m. } CO_2 + 0{\cdot}29 \text{ cub.m. } CO + 0{\cdot}09 \text{ cub.m. } H_2 + 0{\cdot}57 \text{ cub.m. } N_2 = 1 \text{ cub.m.}$$

with which can be associated 0·037 cub.m. of steam, then the combustion gases will contain

$$0{\cdot}21 \text{ cub.m. } CO_2 + 0{\cdot}79 \text{ cub.m. } N_2 = 1 \text{ cub.m., together with } 0{\cdot}078 \text{ cub.m. of steam.}$$

For the combustion of the carbon, there are required

	Per Kilo. C.		Per Lb. C.
Primary air	4·0 cub.m.	..	64·1 c.ft.
Secondary air	4·9 ,,	..	78·6 ,,

from which there are

	Per Kilo. C.		Per Lb. C.
Waste gas (dry)	8·9 cub.m.	..	142·6 c.ft.
Together with steam . .	0·7 ,,	..	11·2 ,,

The waste gases, at 1000° C., convey to the recuperator, per kilogram of carbon,

1000 × 8·9 × 0·37	= 3293 cal.	or 5927	B.Th.U. per lb.
+ 1000 × 0·7 × 0·40	= 280 ,,	,, 504	,, ,,
Total	3573 ,,	,, 6431	,, ,,
Radiation losses may be put at 5 p.ct.	179 cal.		
Chimney losses vary according to the temperature needed to ensure requisite pull. For instance, leaving chimney at 250° C.			
250 × 8·9 × 0·35	779 ,,		
+ 250 × 0·7 × 0·38	66 ,,	1024 ,,	,, 1843 ,, ,,
Remaining available . . .	2549 cal.	or 4588	B.Th.U. per lb.
Of which the secondary air requires only			
750 × 4·9 × 0·33 cal.	1212 ,,	,, 2182	,, ,,
Leaving for steam production	1337 cal.	or 2406	B.Th.U. per lb.

APPLICATION OF THE THEORY.

If, as is usual, the whole of the waste gases pass through the recuperator, preheating the secondary air on the way, they reach the boiler at very much lower temperatures than those

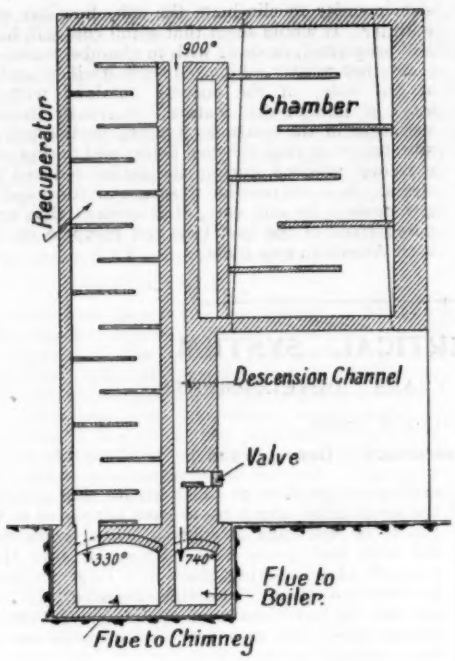


Fig. 1.

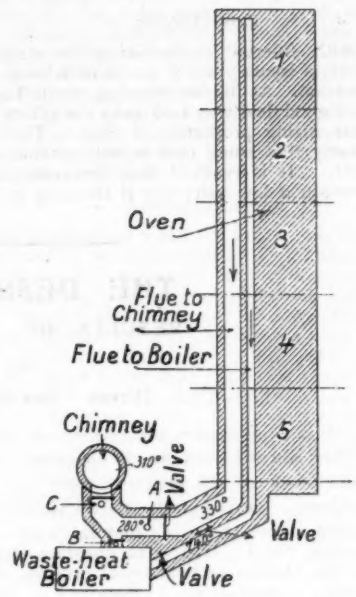


Fig. 2.

SYSTEM OF DISTRIBUTING WASTE GASES IN DESSAU VERTICAL CHAMBERS AT SCHÖNEBERG.

at which they leave the oven, as, in addition to giving up heat to the secondary air, they generally lose also through imperfections in the recuperator walls. The lower temperature of the waste gases requires a larger, and so costlier, boiler, and their considerably greater volume demands induced draught. It was these considerations which gave rise to the described modifications, whereby the surplus waste gas not required for preheating the secondary air was carried direct from the oven through a carefully insulated flue to the waste-heat boiler; the estimated proportions being 48 p.ct. for preheating the air, and 52 p.ct. for steam raising. These, of course, must be modified if preheating of the primary air is also desired. The proportion must in all cases be capable of estimation, as direct measurement usually fails, with whatever apparatus, owing to insufficient flow velocity of the waste gases. But all necessary information can be obtained from their analysis, which is easily carried out. It should be noted, however, that during the analysis extra air must be introduced into the flue leading to the chimney, to ensure that the fumes (A) passing through it contain considerably less carbon dioxide than those (B) which leave the waste-heat boiler. From the mean (C) of the carbon dioxide contents after their mixture at the chimney, the proportions of A and B can be found. Thus

A = 12·0 p.ct. CO_2 (+ O_2)
B = 18·4 ,, ,, (+ O_2)
The mixture C = 14·7 ,, ,, (+ O_2)
If A = 1 − x, and B = x, then x . 18·4 + (1 − x) . 12·0 = 14·7
From A = 1 − x = 0·58 cub.m. waste gas with 12·0 p.ct. CO_2
B = x = 0·42 ,, ,, ,, ,, 18·4 ,, ,,
1·00 ,, ,, ,, ,, 14·7 ,, ,,

Therefore, if the CO_2 at the oven outlet is 18·4 p.ct., the gas quantity A = 0·58 × $\frac{12}{18{\cdot}4}$ = 0·38 cub.m.; and 0·38 cub.m., or 48 p.ct., of waste gases suffice for secondary air heating, and 0·42 cub.m., or 52 p.ct., remain available for steam raising.

This reckoning is only necessary for the first setting of the dividing valve. Afterwards, it only remains to keep the slits clear of adhering dust and dirt. Assuming that 13 lbs. of carbon are consumed in the producer, the estimated steam production by this system, per 100 lbs. of coal carbonized, is equal to the quantity which 3·4 lbs. of good coke would produce in the boiler house. The producer account may, therefore, be justly credited with this amount.

Results in Practice.

So much for the theory. Many objections were raised against it, but they have not materialized. Provision was, however, made, in erecting the plant, for abandoning if necessary the division of the waste gases, and returning to the old practice of sending the whole of the waste gases through the recuperator. The arrangement, in fact, has satisfied all expectations, and, although in theory no more steam could be produced by this method than by the undivided waste-gas stream, yet in practice there are found to be several advantages.

1. The portion going direct to the boiler can be more easily protected against leakages of air from outside, and so reaches the boiler without increase in volume and at higher temperatures.

2. The hot gases effect an excellent heat exchange in the boiler, and efficiency per unit of heating area is improved.

3. Reduced size of boiler and quantities of gas lessen the resistance in the boiler, and eliminate any need for induced draught.

4. Capital and working costs of the boiler are considerably reduced.

It might be contended that the preheating of the secondary air would suffer owing to the smaller quantity of waste gas used for it, but this is not the case to any material extent. Supposing, however, that it was raised to 30° less than usual, this would be compensated by an extra expenditure of merely 0·2 lb. of producer fuel per 100 lbs. of coal carbonized. Loss of heat in a 35 ft. run of flue to the boiler is negligible.

Central or Separate Producers?

The separate producer system was chosen for the Schöneberg vertical chambers. The advantages claimed for central producers—low coke content of clinker, saving in wages, and freedom of the gas from dust—being outweighed by the high capital, working, and repair costs, consumption of current and water, and the increased difficulty of utilizing waste gases. Fuel for central producers must, too, be screened, while the claim that they can use small coke does not apply, since verticals do not produce anything too small for the step-grates of ordinary producers. Herr Körting finds that the upkeep charges for his single producers are low. There is a certain amount of erosion at the hottest parts of the side walls, which proceeds more slowly the deeper it goes. Even if it should penetrate to the neighbouring recuperator, repairs could easily be effected without putting the oven out of action. As regards the much-vaunted freedom from dust with central producers, and its alleged beneficial effect upon the life of the plant, Herr Körting has no complaints to make upon this score. He has vertical retorts in use which have done 4500 carbonizing days, and in Antwerp 5000 have been attained, and their life seems in no way dependent upon the freedom or otherwise of the heating gases from dust. In addition, his separate producers permit of very simple regulation of the heating gases.

Producer Results.

The results from separate producers show a consumption of 16 kilos. of coke, as it comes from the ovens, dry, per 100 kilos. of coal carbonized. This, in addition to carbonizing the coal, serves for the production of water gas, so that 45 cub.m. or more of mixed gas [16,146 c.ft. per ton] come from the retort or chamber. Of this, 12 cub.m. are water gas, which would require 3·6 kilos. of coke to produce them in the generator. The producer consumption for carbonization alone is, therefore, 16 − 3·6 = 12·4 kilos. of coke per 100 kilos. of coal. A further quantity of 2·5 kilos. can be deducted as the saving effected at Schöneberg by waste-heat steam production as against ordinary boiler practice, making 12·4 − 2·5 = 9·9 kilos. Assuming this to contain 15 p.ct. of ash, the consumption, estimated as pure coke, is 8·4 kilos. per 100 kilos. of coal car-

bonized. This could hardly be improved upon with the use of central producers.

Water-Gas Production.

If it is necessary, as is the case at Schöneberg, to work entirely without water-gas generators, some of the retorts can, instead of the normal steaming of the charges, be filled with small coke, and, after heating up, be steamed for long periods, even up to 40 hours. Even if water-gas plant is available, it is quite a good plan to rest it in the summer months, and adopt this other system. Producer firing is the same as for normal carbonization, and works out at the same rate per cub.m. of water gas produced [0·36 kilo.] as the hot blast coke in the ordinary generator process. The coke charged in the retort amounts to 0·3 kilo. per cub.m. of gas, but it is only small coke of little value, and may be reckoned as equal to 0·1 kilo. of larger coke, so that, in all, 0·46 kilo. of coke is required to produce 1 cub.m. of water gas [28·3 lbs. per 1000 c.ft.], against 0·6 kilo. in the ordinary process.

Should, on the other hand, an ordinary water-gas plant be available, the most economical system is undoubtedly to work the whole year through with the same number of settings. During the summer all the water gas required is produced in the carbonizing plant by either charging at longer intervals (18-hour charges) and steaming the retorts so much longer, or by filling a larger number of retorts with fine breeze for steaming purposes. By gradually lowering the duration of the charge to 12 hours, and by producing an ever-increasing quantity of blue gas in the water-gas plant proper, one is able to add quite 50 p.ct. to the summer production, so that the old bugbear of the carbonizer "the oven in slow fire" can be entirely dispensed with. As a matter of course, the variations in the gas requirements within days or weeks can be dealt with in the same way. Finally, it may be mentioned that labour costs at Schöneberg have been considerably reduced by being able to work the retort house and the coal and coke plant with only one shift.

Some Working Results.

The following are some of the results obtained at Schöneberg with the Dessau vertical chamber ovens.

[In the conversions, allowance is made for 1 metric ton = 0·98 English ton.]

Number of ovens	5	
Carbonizing time	24 hours	
Total debenzolized gas per 24 hours (15° C.)	61,550 cub.m	2,173,638 c.ft.
Make per ton of coal	550 ,,	19,735 ,,
Make without benzole extraction	600 ,,	21,529 ,,
Calorific value (0° C.)	4,200 cal.	472 B.Th.U.
In gas $\frac{550 \times 4200}{1{\cdot}073}$	2,153,000 ,,	87 therms per ton
Crude benzole per ton	10 kilos.	22·5 lbs.
Tar per ton	50 ,,	112·5 ,,
Consumption of coke per ton—		
(*a*) For carbonization with simultaneous water-gas production	157 ,,	353 ,,
(*b*) For water-gas production with small-coke retort charges	40 ,,	90 ,,
Small coke consumption for (*b*)	30 ,,	67·5 ,,
,, ,, for boiler house	77 ,,	173·3 ,,
Saleable coke per ton of coal	476 ,,	9·5 cwt.
Net coal consumption (coal carbonized less saleable coke) per 1000 cub.m. gas $\frac{1000 - 476}{550} \times 1000$	953 ,,	59·5 lbs. per 1000 c.ft.

All firing is done with the ovens' own coke or small coke. The total number of men employed per 24 hours from coal bunkers to coke screen is 11.

IMPORTANCE OF FUEL RESEARCH IN THE COAL PROBLEM.

By C. H. Lander, D.Sc., M.Inst.C.E., Director of Fuel Research.

[Outline of an Address to the Edinburgh and East of Scotland Sections of the Society of Chemical Industry and Institute of Chemistry, Jan. 20.]

The important industrial position of Great Britain has been achieved directly by the aid of her natural coal resources. In the past her advantageous position in regard to coal and iron deposits has allowed of a profitable return even from coal mined somewhat wastefully; and industry has flourished in spite of an inefficient use of fuel. But in face of present-day competition, the necessity for both winning and utilizing our coal with the utmost possible efficiency is of primary importance, if we are to hold the industrial field successfully against other nations; and it is obvious that the recovery of the coal industry and the regaining of its former prosperity will be greatly assisted by the steady application of scientific methods, whether to coal production, coal treatment, or coal utilization. The field to be covered is necessarily a very wide one; and the best results can be achieved only by the co-operation of all concerned. Of such significance did possible improvements to be effected by the development of further scientific methods in the winning of coal appear to the Royal Commission, that they recommended that the British Colliery Owners' Research Association should be expanded and placed on such a footing that it could deal adequately with this problem and co-operate with other existing organizations in allied problems.

Coal Purifying at Collieries.

The question of the partial purification of coal prior to its leaving the collieries is one which may well exercise a considerable influence upon its selling value. The system adopted for getting the coal has a bearing upon its preparation for the market, since in addition to such inherent impurities as are derived from the natural inorganic matter or ash of the original plant-substances from which the coal has been formed, dirt (from the roof or floor), which is mainly associated with the small coal, is gathered during the working of the seam. When the coal reaches the surface, it is screened and graded and the larger sizes are partially purified by hand-picking. In many cases, the small sizes of coal are washed. Little systematic inquiry, however, has been devoted to the requirements of coal purification; and several organizations, including the Fuel Research Board, have therefore undertaken investigations of this problem which should lead to an increase in the value of colliery products. But it must be borne in mind that the economic success of such refinements depends in large measure upon local or special conditions, and that their adoption in some cases may be impracticable.

Although coal has played a prominent part in our national development, our knowledge of its physical and chemical nature is still very incomplete; but it is clearly essential, both to the most economical use of coal at home and to its most advantageous disposal abroad, that full information in regard to the properties of the various coal seams should be available. Without such information, it cannot be ensured that the different types of coal will be properly directed to the purpose for which they are best suited or to the markets where they are most likely to give satisfaction and afford the most remunerative return; nor can the utmost proportion of the coal mined be turned to some useful end.

The important bearing of the nature of a coal upon its successful application to any given purpose is becoming increasingly evident; and the greater the precision with which processes of combustion or processes of coal treatment can be carried out, the greater also will become the precision with which it will be necessary to define the characteristics of different grades or types of coal. Progress in the field of fuel utilization, and a growing appreciation of the importance of fuel conservation, is already reacting upon methods of purchase. Buyers overseas are becoming more alive to the significance of coal quality, and are showing a growing inclination to purchase coal to specification.

Survey of National Coal Resources.

The desirability of organizing a survey of the national coal resources was suggested by the Coal Conservation Committee in 1916, in a letter to the Department of Scientific and Industrial Research, which stated that it appeared "to be essential to the most economical use of our coal in this country, and to the most advantageous marketing of it abroad, that there should be available a collection of reliable data giving the chemical analyses of all our different coals. Further, it seems to be essential that these analyses should be prepared upon a uniform basis so as to be readily comparable." Such a survey was consequently undertaken by the Fuel Research Department, and has already yielded results of the greatest interest.

In the past, there have been no standard methods of analysis; and different investigators have adopted variations in procedure which have led to variations in results, and have rendered comparisons uncertain or even definitely misleading. The question of dependable methods of sampling is even more difficult than that of analysis, since the size of the original sample must be kept reasonably small, if the cost is not to be prohibitive. Faced by these difficulties in the compilation of reliable data for the purposes of the national survey, the Fuel Research Board in 1921 appointed a Committee to examine methods for the accurate sampling and analysis of coal. The recommendations made by the Sampling and Analysis Committee have been adopted by the Fuel Research Board, and,

in so far as they are applicable, also by the Committee appointed by the Institution of Civil Engineers on standard forms of test for heat engines and boiler trials. It is hoped, also, that they will become the standard practice of analysis throughout the country, so that all results will be strictly comparable.

NATIONAL FUEL AND POWER COMMITTEE.

There remains the fundamental problem of the optimum utilization of coal in our home industries; and it is the aim of every fuel technologist to ensure such economy in fuel consumption that the coal used in any industrial process, whether in its raw state or after conversion into electricity or coke, gas, and tar, shall yield the utmost possible return for the least possible consumption. I have pointed out on previous occasions the useful service which a comprehensive survey of the power, heat, and light requirements of the various industries of the country, and a careful consideration of their probable future developments, would perform in the elucidation of this important problem. The Coal Commissioners came to the conclusion that such a survey was imperatively required in the national interest, but that, since the problems to be dealt with were so diverse, and the sciences and practices concerned in a state of such active development, it should be a continuous process undertaken by a body of a permanent character. They therefore recommended, to fulfil this purpose, the appointment of a Standing Committee, composed of representatives of the industries concerned, under some such title as the National Fuel and Power Committee.

CONVERSION OF COAL.

Although it is acknowledged that in certain industrial processes, such as steam raising, the advantages to be derived from a preliminary conversion of the energy of coal into other forms are very doubtful, it is equally well recognized that in many cases the use of coal in its natural state is both wasteful and obnoxious. But even where solid fuel still holds the field, enormous aggregate savings might be effected by the proper application of established scientific principles, which in many cases could be effected by recourse to relatively simple methods of fuel control. Many processes are available whereby coal can be converted more or less completely into gas, coke, and oils, in various proportions, or into electrical energy; but their development must naturally be subservient to the commercial possibilities presented.

The introduction of methods of pre-treatment, by which the economic value of the products may be increased above that of the coal itself, however, or whereby the value of low-grade coals or smalls may be stepped-up, would obviously be all to our advantage. At the present time, the most important of such processes are included in electricity generation and in the various systems of carbonization; but recently methods for the liquefaction of coal, and for the conversion of water gas produced from coke into alcohols, have come into prominence. Dr. Bergius, for instance, has shown that, by subjecting coal to high temperatures and pressures in the presence of hydrogen, yields of oil varying from 40 to 70 p.ct. by weight can be obtained. It appears unlikely that liquid fuels could be produced by this process from bituminous coal at prices approaching those at present ruling for natural oils; but the experimental results attained have already led to a commercial exploitation of the process in Germany, where two full-scale units are now under course of erection. In these days, liquid fuel is an essential commodity; and the prospect of establishing a home source of fuel oil is a very attractive one to this country, where natural oil is practically non-existent.

Low-temperature carbonization, however, is the process which it has been most sought here to develop for this purpose, since it offers a means of so treating coal as to obtain not only oil fuel and motor spirit, though in limited quantities, but also a free-burning solid smokeless fuel suitable for either domestic or industrial purposes. Considerable progress has been achieved during the last few years towards the technical and commercial solution of this problem; but a safe pronouncement of its economic possibilities must await the results from full-scale installations working under ordinary commercial conditions. Both in the Maclaurin plant at Glasgow (which is concerned primarily with the production of a smokeless domestic fuel) and the McEwen-Runge plant in the United States (which produces a pulverized coke intended for direct firing under boilers), however, various aspects of the problem are being investigated on a commercial scale; and this should make it easier to reckon correctly the probable future of the process.

Both in France and Germany the synthetic production of alcohol has now passed the experimental stage, and commercial plants have been established.

THE FUTURE.

It would be bold, at this transition period, to venture any definite forecast as to probable future developments; but it seems safe to assume that we are rapidly nearing a period when natural oil supplies will be eked out by oils manufactured from coal. By what particular means this end will be achieved remains to be seen; but it must be borne in mind that, since our coal deposits range over wide limits of composition, and since the demands for any particular form of energy vary both with locality and period, future methods of fuel treatment are likely to remain very diverse, and present methods will no doubt continue to exist side by side with such innovations as may prove to be workable upon a sound commercial basis. It is already evident that future generations will look back upon our methods of fuel utilization as crude and inefficient, and that, by some means or another, we may confidently anticipate a certain increase in the proportion of usefully applied energy attainable from a given initial fuel consumption, whether for the production of power, heat, or light.

COAL AND BYE-PRODUCTS EXPORTS IN 1926.

COAL.

The Board of Trade Returns for December enable us to give a review of the position which was created by the coal stoppage in comparison with the two preceding years. The removal of prohibition permitted the coal industry to recommence exports in December, although the country could have well done with the coal which was sent abroad. Having regard to the future, however, the wisdom of commencing as soon as possible the work of recovering markets overseas is unquestionable. In December the quantity of coal shipped amounted to only 1,608,769 tons, which compares with 4,632,051 tons in December, 1925, and 5,167,525 tons in December, 1924. The values for the three years were: December, 1926, £1,885,313; 1925, £4,275,360; 1924, £5,571,766. Picking out the figures for gas coal for December, it is seen that 264,269 tons were sent abroad, compared with 594,867 tons in December, 1925, and 673,498 tons in December, 1924. The values were: December, 1926, £278,572; 1925, £481,521; 1924, £713,969.

Coming to the figures for the twelve months, it is remarked that, deducting the exports in December, in the first four months of the year overseas business in coal was moving along at an excellent rate. Probably the uncertainty which prevailed regarding a stoppage in the coal industry had some effect in those months of increasing the demand from foreign buyers. In the result we see that last year the total sales of coal abroad amounted to 20,596,571 tons, compared with 50,817,118 tons in 1925—a reduction of no less than 30,220,547 tons, or upwards of 59 p.ct. A worse condition is revealed by comparing the exports with 1924, in which year the total was 61,651,273 tons. The values attached to the exports for the three years were: 1926, £19,137,901; 1925, £50,477,211; 1924, £72,079,547. Examining the classified figures, last year 2,756,056 tons of gas coal were shipped; in 1925, 6,820,414 tons; in 1924, 8,434,869 tons. The values (gas coal only) were: 1926, £2,311,560; 1925, £6,272,545; 1924, £9,565,862. The figures show the disastrous set-back which in coal alone, without any of the products of our manufacturing industries, our trade abroad has suffered.

COKE SHIPMENTS.

Turning to gas coke, December saw the comparatively small shipment of 4235 tons, comparable with 169,864 tons in December, 1925, and 81,187 tons in December, 1924. The values were: December, 1926, £6879; 1925, £173,205; 1924, £137,245. In the twelve months, the exports of gas coke amounted to 387,664 tons; in 1925, to 889,281 tons; and in 1924, to 964,539 tons. The values were: 1926, £402,396; 1925, £963,351; 1924, £1,682,203. Metallurgical coke suffered in even worse degree, seeing that for a long period the ovens were unproductive, and so were unable to supply home markets, which was not the case with gas coke. The overseas trade in metallurgical coke last year amounted to 376,356 tons, compared with 1,222,476 tons in 1925, and 1,847,672 tons in 1924. The values were: 1926, £431,711; 1925, £1,463,585; 1924, £2,999,822.

TAR PRODUCTS.

Such a little business was done abroad in benzole, toluole, and naphtha last month that we will confine the figures to the exports for the year Of benzole and toluole, 420,980 gallons were exported, compared with 146,891 gallons in 1925. Of naphtha, 65,725 gallons were sent overseas, compared with 61,219 gallons in 1925. December saw a good increase in tar, oil, creosote, &c.; the quantity shipped being 660,623 gallons, compared with 366,643 gallons in December, 1925. For the year, the total tar, oil, creosote, &c., exported was 35,287,626 gallons, as against 37,980,205 gallons in 1925.

SULPHATE OF AMMONIA.

In December, sulphate of ammonia exports dropped to 4771

tons, compared with 23,653 tons in December, 1925. The total business for the year overseas was represented by 161,533 tons, as compared with 262,262 tons in 1925—a falling-off roughly of 100,000 tons. All our principal buyers took a smaller quantity last year than the year before. No exports of sulphate of ammonia were made to France, which country in 1925 took 7077 tons. Spain and the Canaries purchased only 37,908 tons, compared with 113,144 tons in 1925. Italy bought only 2760 tons, as against 10,480 tons in 1925. The Dutch East Indies took 19,839 tons, as compared with 27,441 tons. Japan were buyers to the extent of 39,517 tons, as against 42,822 tons in 1925. The British West Indies purchased 5610 tons, as against 10,311 tons in 1925. Amalgamating all other countries, they were purchasers to the extent of 55,899 tons, as compared with 50,987 tons in 1925.

GAS OIL IMPORTS.

In December, the quantity of gas oil received was 11,352,648 gallons, as against 7,306,158 gallons in December, 1925. In the twelve months, the total received was 117,042,798 gallons, as against 72,652,528 gallons in 1925. The ill wind in this country blew some good to the oil markets.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Members of the Yorkshire Junior Gas Association met on Saturday, Jan. 15, at the Bradford Corporation Gas Department's Showrooms, Darley Street, Bradford, to hear an address by Mr. S. H. Packer (Junior Vice-President of the Association, and Past-President of the West Riding of Yorkshire Gas Salesmen's Circle) on "Selling Gas Appliances." Mr. S. T. S. MUSGROVE, of Sheffield, President of the Association, occupied the chair, and there was a good attendance.

Mr. E. J. SUTCLIFFE (Deputy Gas Engineer at Bradford) offered a welcome to the visitors on behalf of the Bradford Gas Committee and Mr. Charles Wood, the Engineer and General Manager, who was unable to be present owing to illness.

SELLING GAS APPLIANCES.

By S. H. PACKER, of Bradford.

Mr. Packer said he had no wish whatever to strike an alarmist note, but he did want to warn all connected with the gas industry not to under-estimate the seriousness of electrical competition. This competition was probably a good deal stronger than some of them realized. Sales of electricity in Great Britain by authorized undertakings had increased by upwards of 50 p.ct. since 1922. This fact was disclosed in the annual report of the Electricity Commissioners for the year ended March 31 last. The great increase in the purchase of electricity was to be seen in the comparative figures given. The total units for 1922 numbered 3,645,190,732. For 1925 the units sold were 5,515,345,364. On an estimated population of 44 millions, this latter figure represented an average consumption of 125 units per head. During that same year (1925), consent was given to sixteen new generating stations, with a total rated capacity of 46,460 kilowatts; and 76 extensions to existing stations were authorized. Mr. Packer said it must be recognized by those engaged in the gas industry that on the publicity side they were handicapped by the fact that practically the whole of the newspaper Press of the country was behind electricity, because it was the new thing. Any opportunity the sensational newspapers got of "downing" gas, they seized with avidity. There was a striking instance of this in Bradford only recently. Lately the street lighting along the main tramway routes had been changed over to electricity. Not a few people questioned whether the change was, in general, any material improvement on the former gas lighting; but this did not alter the fact that electricity was the fashion, and the change had come.

A local newspaper seized on the novelty of the new lighting to publish a couple of night photographs side by side—one, a street scene lighted by the former gas lamps; and the other, the same scene (or alleged to be the same) as lighted by electricity, with, of course, all the credit for better lighting to the latter. Mr. Packer said he had examined the pictures closely, and had come definitely to the conclusion that they were pictures of different parts of the street. The gas-lighted scene was of gas lamps only, on a dry night. The electric lighted scene was of a part of the street onto which was thrown not only the illumination from the electric lamps, but also a blaze of light from shop windows, and probably from the electricity showrooms themselves. Moreover, the street was wet, with all the reflection of light which a wet street could throw up. He had every reason to believe that one picture was taken with a backed plate, and the other not. This, said the speaker, was the kind of grossly unfair treatment which the gas industry was receiving at the hands of a Press pandering to the craze of the moment.

The gas industry must also face the fact that the government authorities, both national and local, were strongly backing everything electrical. Every local authority, big or little, with or without knowledge of the respective merits of gas and electricity, was pushing electricity to the fore, and turning aside from the use of gas. It was a positive obsession with most of these authorities that gas was a thing of the past—a ridiculous obsession, but nevertheless real, and a menace which the industry had to combat. The electrical people had a psychological advantage in the mere newness of electricity. The electricity industry was strong in effective and trained salesmanship. Its showrooms were staffed by men of youthful years, or at any rate youthful outlook—men with the science of salesmanship at their fingers' tips. They were supported by an alluring variation in scales of charges—a system which in some degree, he believed, the gas industry would have to adopt in the near future. In their salesmanship, the electrical people were unworried by varying pressures, varying quality, and that old bugbear of naphthalene trouble.

HELPING THE CAUSE OF GAS.

The situation demanded resistance; and the sinews of successful resistance were being strengthened steadily by better salesmanship and better and more consistent advertising. Selling was a fascinating subject. In seamanship, the unpardonable sin was to lose a ship; in salesmanship the unpardonable crime was to lose a customer who ought to have been retained. The salesman must always remember that the main thing was the customer—not the goods, nor the sale, nor the salesman. A salesman might say, "I sold the lady a £7 10s. cooker." This was no defence if he had so treated the customer that she never came back. He might plead, "But she was a most unreasonable person." This was no excuse. The customer was the only party entitled to be unreasonable.

The five great buying motives of a human being were gain of money, gain of utility, satisfaction of pride, satisfaction of caution, and yielding to persuasion—the persuasion of a good salesman. Probably more sales were secured through the latter motive than all the others put together. The salesman must arouse this motive, because it was the motive which created the willingness to buy.

That the showroom was a necessity was now recognized throughout the gas industry. It need not be very large. A small showroom properly staffed with trained salesmen was better than a large and ornate showroom with a half-trained staff. On the controversial question as to whether showroom windows should be "open" or "closed," he preferred to have the windows closed during selling hours, and open out of selling hours, because many people hesitated to come in if they could be overlooked from outside. Windows were a fine advertisement. Their dressing should be neat and not overcrowded. They should be well ventilated, to avoid steaming of the glass. A strong point was to arrange goods psychologically—goods of the same character, but of cheaper and first-class qualities, side by side, indicating that the department could meet the needs either of the individual with whom economy of initial cost was a problem, or of the person who could afford to be fastidious. Every showroom had its own best selling spot, which should be utilized for all it was worth. At his (Mr. Packer's) own showrooms, the best selling spot was immediately opposite the door. They had proved this times without number. Whatever they put there for display was sold in a couple of days or so. The window displays should be changed frequently, both to keep public interest alive and to create public confidence. The interior display also should be frequently changed for the same reasons; and high-grade, attractive goods should be prominent. Demonstrations, cookery lectures, &c., were successful sellers of appliances. Some undertakings could afford to go so far as to retain a permanent gas cookery expert.

SALE OR HIRE?

A number of undertakings had now abandoned simple hire altogether. Bradford had given it up. For most undertakings the best policy was to sell as much as possible outright; and what could not be sold outright should be sold on the hire-purchase plan. There might be something in the argument that appliances hired remained the property of the undertaking, and therefore were under better control for maintenance; but he could not say he had ever come across anybody who bought gas appliances who was unduly hesitant about asking for maintenance and attention. Increase of simple hiring would mean the doing away with salesmen. All one needed for hire business were order-takers, not trained salesmen. Mr. Packer gave the figures [see table] of the Bradford gas undertaking since it adopted the policy of sale or hire-purchase.

He agreed that it was not particularly easy to do business with the local plumbers and contractors; but it was a business

Particulars of Business Done.

Year Ended.	Appliances.				Percentage.			Small Fittings.	Defects Attended to	Turnover.		
	Cash and Credit.	Hire Purchase	Plumbers	Total.	Cash and Credit.	Hire Purchase	Plumbers			Cash, Credit, and Hire Purchase.	Plumbers.	Total.
										£ s. d.	£ s. d.	£ s. d.
March, 1924 .	1975	162	1358	3495	56·52	4·63	38·85	1034	1792	14,855 14 3	5,465 0 10	20,320 15 1
March, 1925 .	1875	222	1811	3908	47·98	5·68	46·34	1079	2066	15,198 15 5	6,913 7 9	22,112 3 2
March, 1926 .	1984	427	3373	5784	34·3	7·38	58·32	998	1886	14,857 13 10	11,374 15 3	26,232 9 1
Period ended Dec., 1926 .	1240	723	2497	4460	27 8	16·21	55·99	503	1341	9,433 7 1	7,615 9 3	17,048 16 4

well worth getting. To show that it could be obtained, Mr. Packer gave the following figures relating to Bradford:

Business Done with Plumbers.

Year Ended.	Appliances.	Percentage.	Turnover.
			£ s. d.
March, 1924	1358	38·85	5,465 0 10
March, 1925	1811	46·34	6,913 7 9
March, 1926	3373	58·32	11,374 15 3
Period ended December, 1926 .	2497	55·99	7,615 9 3

The more traders used the gas showrooms, the more the undertaking was able to control the class of appliances sold in the area, ensuring the use of apparatus which would give the best results from the gas supplied. The more business they got, whether from plumbers or anybody else, the more rebate the showroom obtained, the more it increased its goodwill. Supplying plumbers meant that, in effect, district showrooms were being set up, and maintained, at no expense to the undertaking.

Mr. Packer went on to speak of newspaper advertising, describing it as by far the best and cheapest form of trade publicity. It was an indispensable link between the showrooms and the consumers. It brought the showrooms' message to the greatest number in the most effective way commensurate with the cost. He suggested that every gas undertaking could afford to allocate at least 2½ p.ct. of turnover to advertising expenditure. In Bradford, from April 1, 1925, to March 31, 1926, they had consistent advertising every week; and their sales jumped up from £22,000 to £26,000. In the nine months of the present working year, they had concentrated their main advertising on hire purchase (at a five years' period) in competition with the electricity people's cooker hiring; and the percentage of hire-purchase had increased from 7·38 to 16·21 in that period.

Discussion.

Mr. A. WYLIE (Sheffield) had thought for a considerable time that the hire of appliances had been greatly overdone, and that undertakings which practised this system were in the near future likely to be put up against a difficult proposition because of the rapid improvement in appliances from year to year. They would be left with a large number of appliances in service on the district which were pronounced obsolete. In regard to advertising and the countering of electrical competition, Mr. Wylie said the large undertakings were well catered for by the "B.C.G.A." and their own local advertising; but it would be interesting to hear Mr. Packer's opinion as to the position of small undertakings in regard to the expense of advertising.

Mr. PACKER said that in many cases one or more smaller undertakings could engage in a combined scheme of advertising in local papers which covered all their areas. By this combination they could secure bigger space; and by consistent advertising they would get the minimum rates. He would also suggest that every small gas undertaking should have its own showroom; and a scheme for completely canvassing its district.

Mr. E. A. LEASK (Leeds) pointed out that the electrical increase of 50 p.ct. in sales over a certain period of years was not necessarily an increase entirely at the expense of gas. A great deal of it was in power units, and replaced former steam power. He disagreed with Mr. Packer's suggestion that electricity showroom staffs were something in the nature of super-beings. He thought it a mistake to concentrate solely on simple hire of appliances. There was room for all systems; and he did not think hire would reduce sales, or hire-purchase sales, because it touched a much wider circle of possible customers than sale alone could touch. In Leeds they had ten years as the hire basis; and if appliances became out-of-date, it was in the interests of the industry itself to scrap them.

Mr. PACKER thought he had not overstated the seriousness of electrical competition.

Mr. T. A. CANNING (Assistant Engineer, Dewsbury) said that, if one looked back at what records were available of sales increases in gas in the period of its history corresponding with the present period of electricity, if would be found that the percentage increases were as notable as were the electricity increases to-day.

Mr. F. CLEGG (Huddersfield) said he was surprised to be informed that in Bradford no appliances were issued free. It struck him that in that case Bradford had a considerable field to tap, because there must be a large population in poor districts who, in the absence of free or hired cookers, must have no cookers at all.

Mr. PACKER said that Bradford had long ago recognized that the gas industry could no more afford to give things away than anybody else could. Personally he was utterly opposed to the issue of free appliances of any kind.

Mr. C. H. CHESTER (Wakefield), speaking of the methods of charging for electricity and gas, said that in a town in which he was formerly engaged there were six methods of charging for electricity. He had worked out each of them for a given consumption for a house, and they all averaged 8d. per unit. Mr. Chester said he disapproved of simple hire of appliances for two reasons. One was that after the stipulated minimum period had expired the customers had a tendency to send their cookers in to the undertaking during the period of the year when they did not need them at home (in Wakefield this happened in the winter-time, when coal was available from the neighbouring collieries at a cheap rate, and the people used coal fires). The other reason against hire was that it involved a heavy capital outlay, which could not be undertaken lightly by small or medium-sized undertakings.

Mr. T. E. PARRY (Sheffield) remarked that, after the five years or so during which the consumer had been paying for his cooker, the consumer would heave a great sigh of relief as he paid the last instalment, and knew that the apparatus was at last his own. But the gas salesman at that stage seemed to come along and tell the consumer that the appliance which had just become his was out-of-date, and that he should purchase a new one. If this was the position, he could not see how hire purchase and keeping appliances up to date could in practice be correlated.

On the motion of Mr. WYLIE (Sheffield), seconded by Mr. G. C. BRADBURY (Elland), a vote of thanks was awarded Mr. Packer for his lecture.

On the proposition of Mr. CHESTER, seconded by Mr. J. W. CARLTON (Shipley), thanks were awarded the Bradford Gas Committee, Mr. Charles Wood, Mr. Sutcliffe, and the officials of the Department for their hospitality in affording the use of the showrooms for the meeting.

NOTES ON NEW BOOKS.

ACCOUNTING PROCEDURES FOR PUBLIC UTILITIES.*

This volume is an ambitious and, on the whole, successful attempt to deal within a compass of approximately 450 pages with financing and accounting for public utility undertakings. It is generally understood that American manufacturers, particularly in mass production factories, are more comprehensive in their accounting and costing systems than are the manufacturers in Great Britain. In the same manner, it appears that the public utility undertakings are advancing in this direction. The difference in practice between the two countries makes it somewhat difficult to assess the value of this work for service in Great Britain. When one considers the great differences in the collection of revenue between gas and electricity undertakings contrasted with railways or telephone and telegraph services, it will be understood how difficult it is to keep the principles in mind, as well as the actual accounting and costing details. In certain details, this volume reaches a very high standard; and the many forms which are given are of the greatest value in initiating the system of accounting. The book suffers, however, in the attempt to cover in one volume not only the broad principles of accounting for public utilities, but, in addition, the actual detailed operations and forms involved. It is natural that gaps occur; and it would have been preferable to divide the volume into two sections, or,

* "Accounting Procedures for Public Utilities," by Warren G. Bailey, M.A., and D. E. Knowles, C.P.A.; being the first of a series of "Public Utilities Texts." Published by Messrs. A. W. Shaw & Co., Ltd., 1926.

alternatively, to issue the work as two volumes—the first the finance and the factors involved in ensuring a proper return on the investment, and matters of administration generally; and the second dealing with the details of costing and accounting as such, together with the forms and detailed books necessary.

The principles of rate structure are very much to the fore in American public utility undertakings; and though in Chapter 2 the authors refer to the importance of rate-making in relation to accounting, yet the principles of rate-making are not considered. Neither is there any indication given of the method of segregation of accounts for the purpose of calculating the rate structure. Importance is drawn to the keeping of fixed capital records; but, beyond general and brief treatment, no attempt has been made to include forms or typical examples showing how the fixed assets are kept trace of, or how adjustments are made from time to time of depreciation, replacements, or renewals. In fact, the depreciation and replacement of assets, and the methods of accounting in connection with the broad principles, might have been given a chapter to themselves, seeing what a large proportion the fixed capital of the utility undertaking bears to its annual turnover.

The volume does not deal fully with the construction of the balance-sheets and annual accounts. Though the threads are described, and followed up in many cases with meticulous care, there is no drawing together of these threads for the purpose of giving shareholders and others a bird's-eye view of the financial position of the undertaking.

It is, of course, a stupendous task to cover within a volume of this size the finance and accounting of public utility undertakings. Some of the chapters are well written, complete, and serviceable, and are of immense value to the administrative officer, accountant, or auditor. Various forms for dealing with stores, meter readings, customers' records, merchandise sales, and so on, are complete and valuable. Customers' payments, petty cash, refunds, and adjustments are also fully considered; and there are good chapters on audit and budget procedure.

On looking through the work, the British gas engineer will find many valuable hints, particularly in regard to uniform accounting; but it is doubtful whether it will ever come to be regarded as a standard work, in view of the inherent differences between American and British practice, and the existence of works in this country dealing with certain branches of the subject in a manner more acceptable to British ideas.

G. E.

ILLUMINATION AND EFFICIENCY.

Joint Report of the Industrial Fatigue Research Board and the Illumination Research Committee.

During recent years, the subject of industrial lighting has received much attention in this country. The Departmental Committee on Factory Lighting have issued three reports; the first dealing with the general lighting of factory premises in regard to adequacy of illumination, the second with the suitability of lighting installations in regard to glare, shadow, &c., and the third with the illumination required on the working plane for different purposes. In the last of these reports, schedules of "fine" and "very fine" processes were given, with tentative suggestions as to the minimum illuminations required; but the need for more precise knowledge of the conditions of illumination desirable on physiological and psychological grounds was strongly emphasized

Shortly after the appointment of the Illumination Research Committee by the Department of Scientific and Industrial Research, the Home Office submitted several problems for investigation; among them being the relation of illumination to the efficiency of workers engaged on fine processes. The Committee decided to accept hand composing in letterpress printing as the first example of fine work to be studied; and they invited the collaboration of the Industrial Fatigue Research Board of the Medical Research Council. The results of the investigation have been published as a Joint Report* of the Industrial Fatigue Research Board and the Illumination Research Committee.

* "The Relation between Illumination and Efficiency in Fine Work (Typesetting by Hand);" published by H.M. Stationery Office, Adastral House, Kingsway, W.C. 2; price 6d. net.

RESULTS OF THE WORK.

The data presented in this report point definitely to the existence of an optimum value of illumination for hand composing, which is of the order of 20 foot-candles. With such a value, provided by a well-planned installation designed to secure approximate uniformity of illumination over the whole area of work, it may be expected that the daylight rate of output will be maintained in practice. It is stated that the interests of employer and worker alike are seriously affected by inadequate lighting of composing rooms. If the illumination is less than 2 foot-candles, nearly one-quarter of the possible output is lost, while the number of mistakes is more than doubled, and the fatigue experienced by the compositors is materially increased. Even when the illumination is as much as 7 foot-candles, over 10 p.ct. of the possible output is lost, and there is an unnecessarily high percentage of errors.

Daylight lamps come in for consideration. Regarding these, the opinion is advanced that their use might be advantageous, but that, owing to their low efficiency, they are of more scientific than practical interest.

The report concludes by stating that, if work is done in artificial light only for a few hours a day, there is no evidence that any undue ocular fatigue is likely to result, providing the illumination is uniform and of the order of 10 foot-candles. The provision of higher values of illumination is largely an economic question, which the results of the investigation show to be well worthy of consideration. If work has to be done continuously in artificial light, as in newspaper offices, the provision of higher values of illumination appears to be essential, if the efficiency of a night shift is to approach that of a day shift.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

The Monthly Meeting of the Western District of the Association was held on Saturday evening, Jan. 15, in the Royal Technical College, Glasgow. Mr. JAMES GRAHAM (the Vice-President), who presided over a good attendance, explained that the President was still unable to be among them. He was sure it was the wish of all present that Mr. Hall would soon recover from his long illness, and once again preside at the meetings.

The SECRETARY intimated that the postponed visit to the coke ovens at Auchengeich had been fixed for Saturday afternoon, Jan. 29. They would leave Glasgow by motor at 2 o'clock.

GAS FIRED HOT WATER SYSTEMS.

By A. KAY, of Glasgow.

[Extract.]

One of the problems of our industry to-day is satisfactory hot water heating for business and domestic requirements by gaseous fuel. For business premises, several installations of central heating by hot water radiators supplied from a gas fired boiler have proved specially suitable. The products of combustion are carried off by the boiler flue, and nothing but convected heat from the pipes and radiators is delivered into the building so heated. The entire absence of dust, the steady delivery of heat units without the attention of a stoker, and the facility of starting-up in the morning, contribute to the success of this system. For dwelling-houses—unless as an auxiliary to a coke boiler—on account of the longer hours the plant would be in operation, this system would be found too expensive, though considerable progress has been made in the United States in this direction, where gas heated steam, hot water, and hot air systems are in operation.

WATER HEATING BY ELECTRICITY.

Our electrical competitors are making progress in their efforts to supply energy for water heating; and, to secure this business, they do not hesitate to supply, in some instances, current at or near the cost of production. At the Fernhill Road Public Baths, North Woolwich, the charge for energy supplied for water heating was at one period approximately ½d. per unit. The system of operating was to heat the bulk of the water during the night hours, when the generating plant would otherwise be standing idle. This system, however, required a relatively large storage tank—in this instance approximately 3500 to 4000 gallons being provided to supply 12 adults' and 6 children's baths. Moreover, to minimize loss of heat during storage, the tank had to be well insulated, and the initial cost of the installation was much greater than a gas heated system for the same service. A departure from usual hot water supply practice, in which the head of water is always maintained in the storage tank irrespective of the volume drawn off, was applied to this installation; and the method of regulating the cold

water supply so as not to exceed the rate of heat supply to the storage tank was adopted. When a draw-off takes place, the volume of hot water so drawn off may largely exceed the cold water supply to make good the deficiency; and consequently the water level in the hot water storage cistern falls, the object being to prevent any possible cooling of the heated water by the cold admission. I have mentioned this installation particularly to show that a serious effort is being made by the electrical industry to capture the water heating business—an effort likely to become intensified as time goes on.

EXAMPLES OF WATER HEATING BY GAS.

The following are a few of the examples of successful installations of gas water heating equipment cited by the author.

At the Corporation Tramway Department Dining Halls, Coplawhill, the hot water supply was found to be totally inadequate. A scheme was prepared, and submitted, to meet the maximum demand for hot water to supply ten lavatory basins, three sinks, two baths, and for cleaning the premises. The requirements were met by the installation of a Keith three-section "Challenge" boiler, bower-barffed to prevent rusting, capable of delivering 120 gallons per hour. This was connected to a copper storage cylinder of 107 gallons capacity, fixed alongside the boiler at a higher elevation, and coated after erection with silicate composition to prevent loss of heat by radiation. The temperature of water is controlled by a Keith thermostat which can be adjusted to any desired degree. In this instance, to supply hot water for washing-up purposes, the thermostat was set at 160° Fahr. The boiler is complete with a gunmetal safety valve, and pilot lights are fitted to each section of the boiler; the connection being taken off prior to the main gas cock.

The circulating pipes between boiler and cylinder are of 1¼ in. copper, fitted with high and low level returns, and economy valve. The flue pipes are of 5 in. Urastone pipe fitted with open-end tee behind the boiler, to reduce the draught. The pipe is carried up vertically inside the building to near ceiling level, then through a wall, and up outside to above the roof level. It is finished with a Urastone cowl. This flue has acted well, and has removed a long-standing complaint.

The boiler has worked most efficiently during two years of continuous use, and has maintained an adequate supply of hot water under all conditions. As the former hot water supply could not be dispensed with during working hours, it was decided to instal the new plant at the week-end; and to enable this to be done, the boiler, copper tank, and connecting pipes and valves were fitted together in the car works, Coplawhill, by tramway employees, working to drawings supplied by the Gas Department. The plant was then disconnected, and removed to the dining halls, ready for erection in position. The gas and water having been cut-off at noon on a Saturday, work was commenced, and the whole of the new installation fitted up by the Tramway Department employees under supervision by ten o'clock on the Sunday morning.

HOT WATER FOR A RESTAURANT.

A similar complaint of inadequate hot water supply during rush hours was experienced in a large restaurant supplying from 2000 to 3000 meals per day. It will be readily understood that the failure of hot water supply in such circumstances was a serious matter for the proprietor. It was found that 100 gallons of hot water in storage was the minimum requirement, and that circulators on hire from the Gas Department were suitable. It was decided to instal a complete new hot water system, consisting of a copper hot water cylinder of 140 gallons capacity supplied from four No. 2 "W. & M." circulators with thermostatic control. As no floor space, and little unoccupied space, was available, some difficulty was experienced in evolving an arrangement to suit the installation. The fact that the cold water supply cistern was on the same floor added to the difficulty of obtaining a working head of water; and the circulators had to be raised 6 ft. 3 ins. from the floor level, to give access to the hoist.

The hot water cylinder was coated after completion with non-conducting composition, to prevent loss of heat.

This installation has maintained a constant supply of high-temperature water under all conditions of service. The firm expressed their entire satisfaction with it; their only regret being that they had not installed it sooner.

KINEMA HEATING.

At a large picture house the existing gas-fired boiler and heating pipes proved unsatisfactory. Examination showed that the boiler (a cast-iron one) was not circulating properly owing to the presence of rust deposit. The flue pipe, also of cast iron, did not act, but filled the boiler room with products of combustion. Also, the radiating surface in the picture house was insufficient.

The management desired as a substitute an appliance on hire which would be kept in order by the Gas Department.

The fitting of two No. 2 circulators to replace the existing cast-iron boiler was suggested, the installation of more radiating surface in the building, and the fixing of a 4½-in. Urastone flue pipe carried above the roof level. These recommendations were agreed to. The Urastone pipe, with its freedom from condensation and rust, has remedied the complaints of down-draught, and has acted most effectively.

The author then described a successful installation of gas circulators used in connection with radiators for heating the developing and printing flat at a large photographic printing works. The system has been in operation for the past winter, and has maintained a temperature of 60° Fahr. within the flat; and the heating of another flat is now under consideration by the firm. The gas consumption works out at approximately 0·3 c.ft. of gas per sq. ft. of radiating surface per hour.

GAS CIRCULATOR AS AUXILIARY.

An engineering firm experienced a deficiency in hot water supply in their staff canteen. In this instance the existing arrangement consisted of a 40-gallon hot water tank supplied from a range boiler fixed in the caretaker's house. When the caretaker went out, the hot water supply failed. To remedy this, it was proposed to fit a No. 2 circulator with thermostat connected to the existing hot water cylinder. The circulator was fitted in position beside the kitchen range, and it acts as an auxiliary to the range boiler, automatically replacing any deficiency in supply.

Discussion.

Mr. J. BOYLE (Greenock), thanking the author, mentioned that the American systems of heating were not free from objection. The increased electrical competition was more or less a fashion; and the installation of up-to-date and efficient appliances would easily counter any competition in this direction.

Mr. A. M. MACRAE (Glasgow) said water heating in Glasgow received every consideration. He instanced, as a cheap alternative to the usual circulating system, a self-contained automatic water-heater, which gave a bath of 20 gallons at 105° Fahr. at a cost of 1·46d. (with gas at 3s. 2d. per 1000 c.ft.). One advantage of the use of this type of heater was that the water supply was connected direct to the hot tap of the bath.

Mr. J. FRAZER (Glasgow) remarked that installations cited in the paper clearly emphasized the fact that gas undertakings should push circulators for summer use in large dwellings.

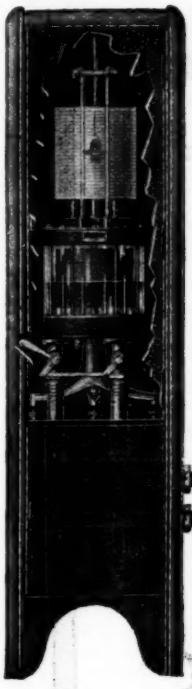
Mr. J. MCISAAC (Glasgow) declared that there was no difficulty in making hot water a success. Where it had failed appliances were not properly fixed. Faulty fittings would never bring good results. Hot water from gas appliances could be made an economical proposition. Gas heaters giving 86 p.ct. efficiency should have no fear for the salesmen. The thermostat on such appliances was absolutely essential, as eliminating the human element.

The CHAIRMAN, in thanking Mr. Kay, mentioned that a better knowledge of hot water appliances, and if possible cheaper installations, would go a long way to combat electrical competition—particularly in dwelling houses.

Surface Brightness of Diffusing Glassware.

There has been published by H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, at 9d. net, Illumination Research Technical Paper No. 4—"Surface Brightness of Diffusing Glassware for Illumination." The work has been carried out for the Department of Scientific and Industrial Research by Mr. C. J. W. Grieveson, B.Sc., M.A., of the National Physical Laboratory. In a prefatory note, Mr. C. C. Paterson, O.B.E., M.I.E.E., Assoc.M.Inst.C.E., the Chairman of the Illumination Research Committee, says that "It is now generally recognized by those interested in the provision of artificial lighting that most modern light sources are so bright as to interfere seriously with comfort and visual performance unless they are either far removed from the line of sight, or, alternatively, surrounded with a diffusing glass bowl or similar device, which, by greatly increasing the luminous area, diminishes its brightness to a comfortable value. The bowl becomes the effective source of light, and its larger size has the additional advantage of producing softer shadows than those given by the bare source. The appreciation of these facts has led to a widespread demand for diffusing glassware fittings, a demand which has been met by the production of globes and bowls varying widely in shape, size, and material." In compliance with a request received from the British Engineering Standards Association, arrangements were made for experiments to be carried out at the National Physical Laboratory, with the object of obtaining reliable information on the properties of diffusing glassware. The report of the Illumination Research Committee gives the results of measurements of the surface brightness of eighteen diffusing bowls used for interior lighting; each bowl being fitted with a gas-filled electric lamp of a size stated by the makers to be most suitable. These results will be of interest to illuminating engineers, architects, and others.

INTEGRA



GAS FLOW
RECORDER
(With or Without Counter)
10 in. CHART

The accuracy of a Station Meter

ROBUST
RELIABLE
INEXPENSIVE

Write for particulars—
THE INTEGRA CO. LTD.
183, BROAD STREET
BIRMINGHAM
Head Office in Belgium.

BENZOL IN BULK

CHAS. PAGE & CO., Ltd.
MERCHANTS. 37/39, KING WILLIAM ST., LONDON, E.C. EXPORTERS.

TAR PRODUCTS.

Telephone: City 5408 (10 lines).

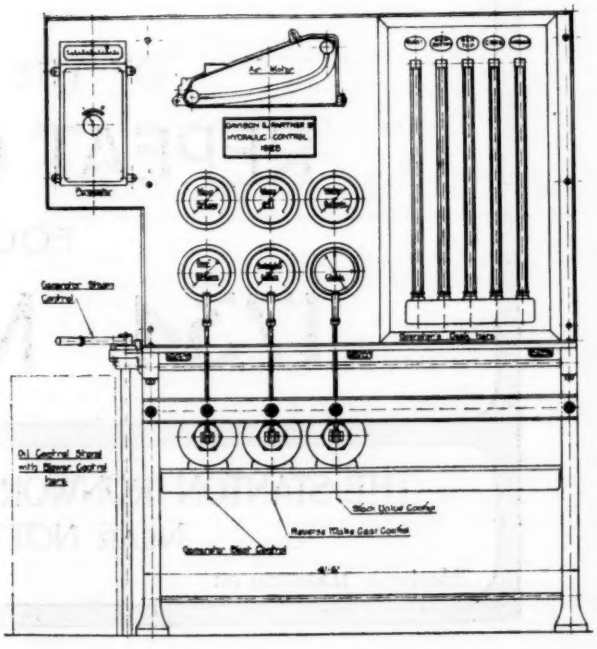
DAVISON & PARTNER, LTD.,
11, Carteret St.,
WESTMINSTER, S.W. 1.

FIT YOUR WATER-GAS PLANT
WITH
Hand-Hydraulic Operating Gear
AND
SAVE OPERATING TIME.

LOW PRESSURE SYSTEM.

GAS-MAKING TIME PER SHIFT INCREASED.

CONTINUOUS SPLIT-RUNNING possible on the largest plants.



PART or FULL GEAR Supplied.

UP TO DECR 31ST
1926

TOTAL
ORDERS
RECEIVED
EQUAL

2,246 MILES

FROM 719 CUSTOMERS

OF THE ABOVE

REPEAT ORDERS

EQUAL

1734 MILES

THE STANTON IRONWORKS COMPANY, LIMITED
NEAR NOTTINGHAM.

Telephone: ILKESTON 86. Telegrams: "STANTON, ALFRETON."

MIDLAND JUNIOR GAS ASSOCIATION.

At a meeting of the Association held on Thursday, Jan. 20, in the Birmingham Council House, under the Presidency of Mr. C. F. TOOBY (Coventry), a paper was presented by Mr. A. R. Myhill, who, the President observed, was an old member of the Association, to which he for a long period acted as Hon. Treasurer.

SOME NOTES ON THE OPERATION OF GAS PRODUCERS, WITH SPECIAL REFERENCE TO GAS-WORKS PRACTICE.

By A. R. MYHILL, A.I.C., of the Central Laboratory, Nechells Gas-Works, Birmingham.

[EXTRACT.]

[In the first part of his paper the author dealt in detail with the theoretical principles of producer gas heaters.]

In studying the factors making for good or bad working, one is confronted with much complication. From the points of view of rate of gasification and gas quality, the conditions to be aimed at are:

(1) Maximum temperature.
(2) Maximum time of contact of air and steam with fuel.
(3) Maximum exposure of fuel surface to air and steam.

Upon examining these points in detail, however, it will be realized that there are certain practical limitations to the adoption of such means as will produce the above conditions, and that compromises will need to be made before these principles can be adapted to works practice.

TEMPERATURE.

Taking the first point—that of temperature—one has to consider, first, the effect of conditions which produce high temperature, and, secondly, the effects of high temperature apart from gas generation. The condition which produces high temperature is a high air-steam ratio; and it has been shown that the effect of this is to increase the sensible heat at the expense of the calorific value of the gas. In addition, high temperatures mean high gasification rates; and, if the fuel is finely divided, this may result in appreciable loss of fuel in the form of dust. High gasification rate also means short time contact, so that the effect of the higher temperature is to some extent nullified by this.

The main objection, however, to the employment of high fuel temperatures in such producers as are used in gas-works practice is the formation of clinker, due to the partial fusion and agglomeration of the inorganic mineral matter of the fuel. Owing to the comparatively high temperatures prevailing, even in the best regulated producers, all the ash of the fuel is removed in the form of partly fused lumps, incorporated with more or less combustible matter.

For certain purposes gas producers are built which are worked at sufficiently high temperatures completely to fuse the ash, which is run off in a molten condition and cast into blocks for building purposes. In fact, it has been suggested by some authorities that the enormous increase in gasification rate which can be obtained at temperatures above 1500° C.—such as prevail, for instance, in blast furnace practice—would justify the general adoption of the principle of operating at much higher temperatures than is customary at present. It is the general practice, however, to remedy or prevent the trouble occasioned by the presence of clinker by keeping it in its least harmful form, and removing it often. Such conditions are brought about when working with comparatively low temperatures at the bottom of the fuel bed.

CLINKER.

Clinker may be seriously destructive to furnace lining in two ways—chemically, by fluxing with the refractory material; and mechanically, by troubles caused during its removal. Its presence among the fuel has the effect of retarding the general flow of gases, and restricting the output. In addition, the disposition of lumps of incombustible material among the fuel leads to channelling of the air, with local excessive heating and gas high in CO_2.

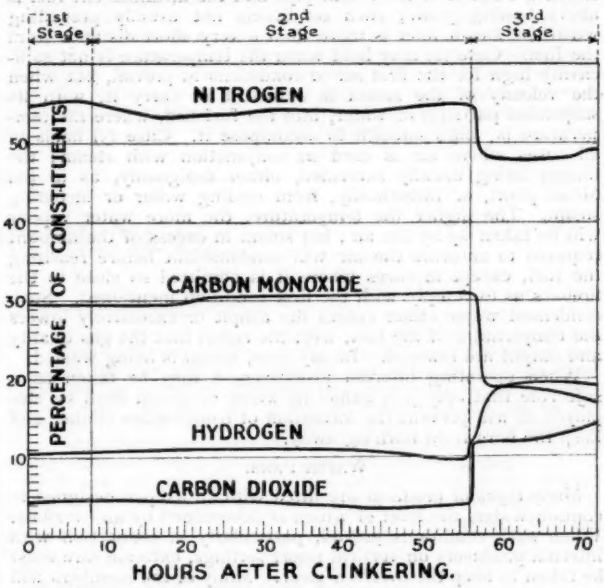
Clinker is extremely difficult to remove when it forms just above the arch of the clinkering door; and it is at this position that a careful watch ought always to be kept, as it may be present here unsuspected. Unless a good, long bent clinkering bar is frequently pushed upwards to break up the clinker, the latter rapidly accumulates at this point, and may do so to such an extent as to necessitate shutting-down, and even partial rebuilding, owing to its adherence to the brickwork. The formation of clinker in this position is usually due to local high temperatures, and may be avoided if the steam supply is so regulated as to keep the temperature of the hot zone below the softening-point of the ash. The local high temperature is often caused by short-circuiting of air round the outside of the fuel, and may be guarded against by carefully "ashing-up" the front of the fire with small damp ashes, well rammed in.

Apart from the purely endothermic effect, steam has a more or less mechanical effect in softening the clinker and rendering it more readily removable. For this reason, in producers of the flat bar grate type, a certain amount of steam is usually allowed to play on the bars—particularly towards the back—for a few hours immediately prior to clinkering. The quantity of steam which is admitted in this way should be carefully regulated so as to avoid excess. This is a matter which probably receives less attention than it deserves. In up-to-date installations, flat bar grates, necessitating the employment of false bars during clinkering, are rapidly giving way to step grates, which require practically no clinkering in the usual acceptance of the term, and need only to be "trimmed-up" every few hours—such work being not at all arduous, if the producers are worked correctly.

FLAT BAR GRATES.

With flat bar grates, it is usual to clinker at comparatively long intervals; and it is found that the gradual accumulation of clinker leads to a reduction in the quantity of gas made as the time approaches for clinkering, and often to comparatively poor gas due to channelling. The curves shown in the graph were constructed from a series of gas analyses carried out on an internal producer serving to heat a bed of four 5-ton Woodall-Duckham retorts. This producer was fitted with a flat bar grate. Gas analyses were carried out on spot samples at intervals over its normal cycle of 72 hours. Commencing with a freshly clinkered fire, the cycle could be divided into three periods:

(1) *First 8 hours.*—Primary air slides on doors fully open. Air also drawn in at trumpet tubes around steam-air injectors. No steam on. Some water running over bars on to ashpan.



First Stage: Primary Air Slides open. No steam.
Second ,, : ,, ,, ,, closed. Steam on injectors.
Third ,, : ,, ,, ,, ,, ,, ,, ,, and on firebars.

Effect of Steaming Conditions on Composition of Producer Gas.

(2) *Next 48 hours.*—Primary air slides on doors shut. All air entering at steam-air injectors. Water running over firebars. Steam on at injectors.

(3) *Final 16 hours.*—Primary air slides on doors shut. All air entering at steam-air injectors. Water running over firebars. Steam on at injectors, and extra steam on bars for softening clinker.

In the case under test, the steam which served for injecting the primary air entered at the front of the fire, some distance from the bars. Its pressure was kept approximately constant during the test. All the air passing to the producer was not drawn in by the injecting action of the steam; a certain proportion being drawn in at the same position through the funnel-shaped tube surrounding the steam jet by the pull of the waste-heat boiler fan working on the setting. The steam to the firebars during the last 16 hours passed mainly along the back of the fire, and impinged on the bars.

It will be seen that there was very little change in the composition of the gas from the time of clinkering to the time of admitting steam for softening the clinker—*i.e.*, the shutting of the air slides and starting-up the injector steam made practically no difference to the composition of the gas. As a matter of fact, it is highly probable that no extra steam entered the fuel bed when the injectors were put to work, since the steam injector nozzle was a considerable distance from the firebars. The extra air injected by the steam was probably balanced by the decrease due to shutting the slides on the doors; and the extra water vapour probably condensed in the ash pan without entering the fuel bed. At all events, it is evident from the gas analysis that the steam-air ratio remained the same, even

though more actual steam was admitted. Upon admitting steam to the firebars for softening the clinker, however, it will be noticed that there was a sudden drop in CO content, and a sudden increase in hydrogen and CO_2, indicating that the steam was in excess of that required for the production of good water gas.

The curves, although illustrating in a marked manner the effect of excess steam on the composition of the gas, do not, unfortunately, show the variation in the quantity of gas made, as there was no means of measuring this amount; but it will be realized that the employment of a flat bar grate, and the necessary adoption of the usual clinkering routine, does not yield gas-making results of the uniformity which can be obtained when step grates are used. In the latter case, clinker is never allowed to accumulate to sufficient extent materially to affect gas composition or rate of generation.

As the secondary air supplied to retort settings is usually fairly constant, it is probably in excess during the last few hours prior to clinkering, since the quality and quantity of gas are such as would need less air for complete combustion.

Supply of Steam.

Regarding the supply of steam to producers, it must be realized that turning on more steam at the base of the fire does not necessarily imply that more steam is being used-up. There are three forms in which water may enter the fuel bed and take part in the producer reactions:

(1) As dry saturated or superheated steam.
(2) As wet steam.
(3) As water vapour carried by air.

Case (1) holds when the temperature of the whole zone between the outlet of the steam pipe and the incandescent fuel is above boiling point; such conditions not usually prevailing when the steam inlet is more than a very short distance from the fuel. Case (2) may hold when the temperature is not sufficiently high for the first set of conditions to prevail, but when the velocity of the steam is sufficient to carry it, with its suspended particles of water, into the fuel bed, where the temperature is high enough to decompose it. Case (3) holds in all cases where air is used in conjunction with steam; the former being usually saturated, either designedly, as in the Mond plant, or incidentally, from cooling water or incoming steam. The higher the temperature, the more water vapour will be taken up by the air; but steam in excess of the amount required to saturate the air will condense-out before reaching the fuel, except in cases where it is admitted so close to the firebars as to comply with the first condition mentioned. Such condensed water either enters the ashpit or excessively lowers the temperature of the fuel, with the result that the gas quality and output are lowered. In any case, steam is being wasted.

When operating internal producers, it may be taken as a safe rule that only just sufficient water or steam shall be employed as will prevent the formation of troublesome clinker and keep the bars from burning away.

Water Pans.

Many types of producer are fitted with an ashpan designed to contain water, the level of which is determined by an overflow. When such conditions prevail, particularly in connection with internal producers on vertical retort settings, extreme care must be taken to keep the overflow clear. Many of the members will no doubt remember that Mr. Sylvester, in the course of a paper before the Association in 1924, gave an account of trouble which was experienced at West Bromwich in connection with this matter. On this occasion it was found that water, having access to the flues, had resulted in the disintegration of the brickwork under the ashpan, causing short-circuiting which entirely upset the heating arrangements of the retorts. In order to overcome the trouble to some extent, it became necessary to cut-out completely a section of the regenerator—an arrangement which resulted in considerable improvement in carbonizing heats, in spite of reduced recuperative capacity.

Similar trouble was experienced at one of the Birmingham works a short time ago. In this case, the producers were provided with step grates; and it was eventually decided to dispense with the use of a water pan altogether, and to keep the bars cool by live steam issuing from holes in pipes inclined at the angle of the steps of the grate—such holes being a few inches only from the bars, and directing the steam into the body of the fuel. This arrangement is still in use, and has given no trouble since its installation several months ago.

Depth of Fuel Bed and Size of Fuel.

The question of depth of fuel bed is an important one. Whether it is decided to operate with a deep or a shallow bed, it may be taken as a universal rule that the depth should be kept as constant as possible during the period of gasification. The fuel depth should also be uniform over the whole grate area, so that the resistance to gas flow is uniform over this area—*i.e.*, there must be no shallow portions where the bulk of the air may pass, consuming the carbon direct to CO_2.

Speaking generally, the deeper the fuel bed the higher the CO content, since a deep fuel bed means long time contact, and more exposed fuel surface. The important factor, however, which limits the depth of the fuel is its resistance to gas flow, with a consequent lowering of temperature and gasification rate. The deciding factor in the choice of a deep or shallow fuel bed is the nature of the fuel used. As a general rule, the larger the fuel used the deeper should be the bed, although it must be remembered that certain fuels, initially consisting of large pieces, are so friable as to break into smaller pieces during the process of gasification, and must be treated as though they were originally smalls.

With good coke for producers on retort settings, it is usual to employ a fuel depth of not less than 5 ft.; but where the fuel is small, it is often better to work with a shallower bed. Retort settings are often poorly heated because the question of size of fuel is not taken sufficiently into consideration. If poor heats are obtained with large coke and relatively shallow producers, they may often be improved by (1) breaking the coke smaller, or (2) increasing the depth of fuel, if this is possible. On the other hand, should poor heats be obtained with small fuel, as sometimes occurs when firing with breeze, improvement may be effected by working with a shallower fuel bed. This is sometimes done by raising the firebars.

It is a good plan to have as large a grate area as can be conveniently worked. This allows a margin for cases where it becomes necessary to work with fuel of a lower grade than usual. A large grate area minimizes the amount of "pull" required; good contact of air, steam, and fuel is assured; and local high temperatures are avoided. Perhaps the only drawback to having too much grate area is a tendency for the upper layers of fuel to be too low in temperature, with the consequent formation of gas high in CO_2.

Apart from size alone, certain fuels are more easily gasified than others—probably largely on account of their porosity. Dust should be avoided as far as possible, unless the producer is of a special type designed for such fuel. (By the term "dust" is understood very fine material—say, less than $\frac{1}{16}$-in. cube.) Even fair-sized coke, if dusty, may give trouble on account of irregular combustion due to the clogging of the pores. This is specially noticeable if the dust is of an earthy or non-inflammable nature.

Bituminous Fuels.

In dealing with external producers, it is sometimes customary to use bituminous fuels. In such cases, it should be remembered that a slightly caking coal usually gives better results than a non-caking one, on account of the fact that the semi-fusion of the material prevents trouble due to dust. Unless special producers having mechanical stirring devices are used, rich, highly-caking coals should be avoided, as they are very liable to give rise to channelling and general bad working, due to lumpiness, and holding-up of the fuel. Mixed fuels, having ash of different fusing points, or gasifying at different rates, may give great trouble, owing to the early formation of ash from one fuel, such ash being deposited in the hot zone of the other fuel.

Curtain System.

The curtain system of building producers, both internal and external, is valuable in securing uniformity in gas composition, more particularly in cases of producers which are fed with cold fuel. Where there is no curtain arrangement, the composition of the gas may vary considerably. For instance, a producer which would burn all the coke completely to CO_2 within itself when operating on a fuel depth of 1 ft., may be made to yield a good quality gas containing 33 to 34 p.ct. of carbon monoxide, when this depth is increased to 4 ft. Such a producer, built without a curtain, would yield gas of very variable composition as the column of fuel burnt down. With a curtain arch, however, the effective fuel depth remains constant, provided the arch is kept sealed with fuel.

External Producers.

Although it is the usual practice to heat gas retorts by means of internal producers, on account of the extra thermal efficiency due to the sensible heat of the producer gas, there are certain points in favour of the adoption of external producers for such a purpose, with means for cleaning the gas before combustion. This system is already in use in coke oven practice. Admitting that a certain amount of heat is lost by cooling the gas in the course of its cleaning, the absence of flue dust has a marked effect in lengthening the life of refractories; and the control of the heating of a large setting is often easier when working with an outside supply of gas for a large number of carbonizing units than when one has a separate producer for each bed. The question largely depends upon the state of the markets. Where there is a ready sale of coke and a plentiful supply of cheap slack, it may pay to use the latter on external producers, constructed to deal with such a type of fuel, and to conserve the coke for sale. These considerations, together with the possibility of bye-product recovery, may turn the scale in favour of this departure from normal practice.

Conclusion.

I have been compelled by considerations of space and time to touch but briefly upon the outstanding points connected with the operation of producers. That there are many blanks which could be filled with advantage, is apparent to all of you. I have endeavoured to emphasize the fact that the operation of producers is a matter requiring scientific control. In this connection, it will be found that the adherence to a very definitely

formulated plan of work, particularly as regards times and quantities, is absolutely essential, in order to obtain the maximum efficiency.

Whenever possible the plan should be so "cut and dried" as to eliminate errors due to the exercise of discretion by unskilled persons. No deviation from instructions should take place, except by previous consultation of the workman with the person in charge. All control apparatus—such as cocks, gauges, nozzles, &c.—should be as foolproof as possible, and so constructed and laid out that it will be easier to work them rightly than wrongly. Examples of indefinite instructions which are to be avoided are: Keep a certain valve "half open;" or Allow a "small quantity" of water to pass at a certain point. Such expressions mean nothing, and permit too much to depend upon personal bias or mechanical idiosyncrasies. Where actual quantities of material are unknown, it should be possible to ensure that conditions are capable of reproduction at will, and variable to known amounts, even though the units of measurement may be arbitrary. The whole subject of system and organization whereby comparatively unskilled labour may be used for carrying out operations involving scientific principles is a large one, and mainly beyond the scope of this paper. I allude to it only in order to emphasize its importance and worth of study.

In conclusion, I should like to thank my chief, Mr. T. F. E. Rhead, M.Sc., F.I.C., for help and kindly criticism in the preparation of this paper, and for permission to publish the results of experience gained on the chemical staff of the Birmingham Gas Department.

Discussion.

The PRESIDENT said it was essential that the fuel in the producer should be used economically, and also that the producer should be soundly constructed. There should be ready facilities for the charging of the coke. He agreed that it was possible to get too big an area. Care should be taken to ensure proper gasification of the fuel. Full regard should be had, too, to correctness of temperature in the producer. He emphasized the importance of keeping up the depth of the fuel. His advice was: Never allow it to go down very low.

Mr. MCNORTON (Wolverhampton), proposing a vote of thanks to the author, inquired what was the quantity of saleable coke recovered at the clinkering pans. Again, had Mr. Myhill had any experience with having the bottom of the fire wet, and the moisture going through to the silica work?

Mr. C. F. W. RENDLE (Redditch), who seconded, said there was probably no other phase of gas-works practice in which there were so many contradictory factors. In some circumstances it was desirable, and they were told to have a large grate area; while from the point of view of another consideration it was undesirable. The whole burden of the paper was that a lot of details must be carefully watched and checked. He agreed as to the added efficiency of the step grate. The economy that arose from the use of these grates might be due to the smaller amount of coke lost. He, personally, was putting producers to a rather novel use—to enable him to raise steam from his quasi-waste-heat boiler. He was making producer gas, and burning it.

Mr. A. HARVEY (Saltley) suggested that in the outside producer they had a means by which they could regulate the exact quantity of producer gas required. On the other hand, with internal producers they could not measure the quantities very well.

Mr. C. GREGORY (Adderley Street Works) said he was not in favour of the contention that by the adoption of the step grate reduced loss of fuel was effected. His view was that there was more waste with the step grate.

Mr. H. R. HEMS (Birmingham Industrial Research Laboratories), speaking from the point of view of distribution, pointed to the difficulty experienced in obtaining the necessary scientific control of producers in general manufacturing concerns.

Mr. MYHILL, in reply to various points raised, urged the need for efficient supervision of producer plants. Too much responsibility should not be left to workmen—there should be installed, as far as possible, fool-proof apparatus. He did not attach too much importance to gas analyses. While he admitted their value, so many things could happen in the producer that it was necessary to apply common sense to obtain correct interpretations. He believed the time would come when producers would be worked at higher temperatures than at present. External producers could be better controlled; but at the same time there was a certain amount of heat loss. On the other hand, there was something to be said for internal producers. He attached the utmost importance to screening the coke for producers. Such work was well justified by results.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Confidence in Gas.

SIR,—"He who has lost confidence has nothing else to lose"—this is indeed a true saying. I am referring particularly to the address on "Gas Lighting" by Mr. F. J. Gould, Chairman of the Council of the Society of British Gas Industries, extracts of which paper were reproduced in your columns to hand a mail or so ago. This address, which can be obtained in leaflet form, together with that interesting book "The Discoverer of Gas Lighting," by Mr. W. T. Layton, should be read not only by all young men in the industry, but by those engineers who consider that the lighting load is lost beyond redemption.

I am writing this letter 7000 miles away from the home of the gas business, but I am one constantly in touch with every section and branch of gas in England, not only by correspondence and journals, but by frequent visits to Europe, incorporating in these visits a large tour of gas-works, showrooms, and manufacturing workshops. Each time while in England, it becomes more and more pronounced to me that "gas for everything—except lighting" is the generally accepted slogan in the profession.

We all know it is easiest to follow the line of least resistance; and those who hold positions in the Tropics know the axiom only too well. It is recognized that more detailed attention is needed where gas is supplied for lighting than when it is supplied for cooking and heating purposes; and this to my mind is the principal reason for the regrettable outlook generally vouchsafed the lighting (and particularly the private lighting) branch of our industry in Britain.

As I write in my office, the thermometer is registering 90 degrees under a fan—and this is the cool season (humidity 70 p.ct.). In Colombo there is a strong Electric Company which year by year returns a dividend of 15 p.ct., free of tax, and places a few tens of thousands of pounds sterling to various reserves. A fire of any description is never dreamt of, most bungalows have electric fans, all bungalows are more or less open and subject to air currents which are none too favourable to gas burners, and even the mere suggestion of "gas" tends to perspiration. Yet, by dint of perseverance, advertising, confidence, and personal enthusiasm in gas as a means to *the* end, the lighting branch of our business alone has increased by nearly 50 p.ct. in five years; and last year we manufactured 220 million c.ft.

It cannot be said, therefore, that in Colombo we follow that least resistant line. We have to be continually alert, fighting for our output and records month by month; and the general results we produce will astonish many an English undertaking.

We carry on fitting up houses with gas lights, and "booming" gas, because we have confidence in the fuel we are selling. It is a national disaster to think that young men are year by year being trained, and passed out as so-called gas engineers, in the knowledge that lighting gas must be cut out.

In England to-day we have firms bearing household names who specialize in gas lighting apparatus and who produce the best article for the particular requirement. There is no excuse in showing a "loss" except it be the excuse of sheer apathy and/or indifference. It is a matter of regret, or should be, for the industry as a whole, that company directors or gas committees accept without strong comment their engineers' report of losses in lighting.

As it was written years ago, all Gaul *divisa est in tres partes*, so am I of the opinion that gas for lighting can be increased (I will not be a party to the word "retained") if the engineer or seller bases his creed on the following three fundamentals:

(1) Confidence in "gas for everything."

(2) Mastery of the subject from A to Z.

(3) Personal enthusiasm resulting from (1) and (2).

Success comes in "cans," not "can'ts;" and the man who says "it can't be done" is liable to get interrupted by somebody doing it. *Fiat Lux!* Preferably gas.

S. BARKER JOHNSON,
Engineer and Manager,
Colombo Gas and Water Company, Ltd.

Colombo,
Jan. 6, 1927.

Visit to the East Greenwich Gas-Works.

SIR,—I beg to draw your attention to an error made in the current "JOURNAL" in the report of the visit of the London and Southern District Junior Gas Association to our East Greenwich Works on Saturday last.

In the course of my remarks, I stated that the retort houses were originally designed for a capacity of 5,000,000 c.ft. each per diem, which represented a total of 20,000,000 c.ft. for the first block of four retort houses.

At the present day, owing to improved methods of carbonization, especially the introduction of the mass charge system, the output per retort house is approximately 7,500,000 c.ft. Calculation by modern methods is quite simple, inasmuch as each retort gives an approximate yield of 100 therms per day, which figure multiplied by 450 (this being the number of retorts in each house) would represent a yield of 45,000 therms for each house. This is equivalent to 180,000 therms for the four retort houses for 24 hours, which is four times the amount shown in the "JOURNAL."

F. A. FROST.

South Metropolitan Gas Company,
709, Old Kent Road, S.E. 15,
Jan. 20, 1927.

REGISTER OF PATENTS.

Handling and Discharging Coke.—No. 262,856.

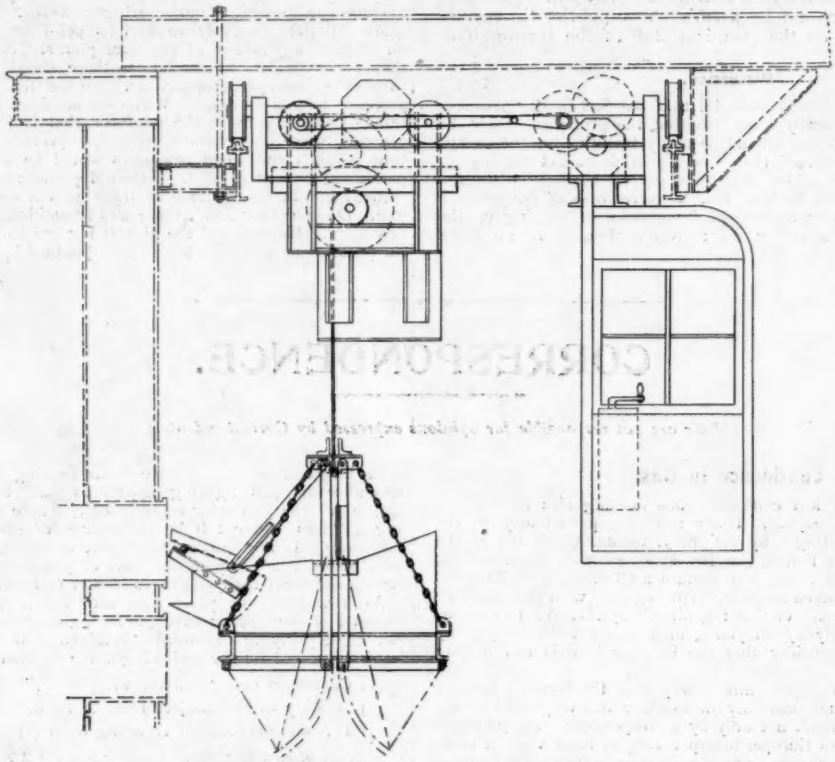
SINGLETON, H., of Huddersfield.

No. 23,040; Sept. 16, 1925.

This invention is primarily intended for handling and discharging coke from horizontal retorts or coke ovens, but can also be used for ash handling in connection with steam generators.

A skip controlled from a telpher cab is provided with means whereby, in addition to being raised and lowered, it can be moved towards and away from the retort mouthpieces. For this purpose the telpher is arranged to be traversed along a double rail, and the winding gear is mounted on a carriage. A feature of the invention consists in mounting the telpher cab at the end of the telpher frame that is furthest away from the discharge outlets, and another feature consists in constructing the skip with an improved form of discharge apparatus whereby it will automatically discharge its contents into a hopper, which may in the case of a retort house be situated at the foot of the usual elevator or conveyor.

From the end elevation which we reproduce, it will be seen that the telpher comprises a rectangular framework suspended by wheels from two rails extending along the retort house; an electric motor



SINGLETON'S TELPHER AND AUTOMATIC SKIP.

or other driving device imparting motion to one of the wheel axles for traversing the telpher. The winding gear is mounted on a rectangular frame also supported by wheels. This winding gear is operated and controlled by a motor mounted on the winding-gear frame. For traversing the winding-gear frame towards and away from the front of the retort bench, a shaft mounted on the telpher frame is provided at each end with a crank connected by a rod to one of the axles on the winding-gear frame; and this crank shaft is connected by gearing with a reversible motor. All three motors referred to are controlled from the driver's cab.

The skip is formed with a lip at the front adapted to project under the retort mouthpiece for receiving coke; and to enable it to discharge its contents automatically, it is provided with a hinged bottom made in halves and meeting in the centre. The free end of each hinged portion is connected by links with a lifting bar which is also connected to the ends of the skip framework by chains and to cables or chains appertaining to the winding gear; the arrangement being such that the last-mentioned cables or chains support the whole of the weight on the bottom of the skip. When the skip is lowered on to the top of the hopper or other point of discharge, and the winding cables are lowered, the material opens the bottom of the skip and falls out.

Gas Manufacture.—No. 262,834.

NIELSEN, H., of Muswell Hill, and LAING, B., of Hatfield.

No. 16,014; June 20, 1925.

This invention relates to the manufacture of gas of high calorific value and low specific gravity for industrial or domestic heating; the feature being the reduction of CO_2 by contact with semi-coke at 750° to 850° C.

The semi-coke produced by the low-temperature distillation of carbonaceous materials such as black coal, lignite, brown coal, peat, or wood at temperatures ranging between 400° and 800° C. can be employed for carrying on the present invention; but the most suitable form of semi-coke is that obtained by so-called internal heating. Such semi-coke, in particular, enables the conversion of CO_2 into CO to proceed practically quantitatively at much lower temperatures than heretofore—that is to say, temperatures between 750° and 850° C. For example, by employing as the reducing agent the semi-coke which is produced from brown coal by internal heating, the patentees have been able to reduce to CO, at temperatures below 800° C., the CO_2 contents of a gas containing 25 to 30 p.ct. of CO_2, so as to leave only 2 to 3 p.ct. of CO_2 in the remaining gas.

A suitable gas containing anything from 20 to 40 p.ct. of CO_2 can be obtained from lignite or brown coal by so-called chemical condensation; and the CO_2 so produced can be reduced simultaneously with the heating-up of the CO to suitable temperatures for low-temperature distillation purposes. For example, a firebrick lined chequerwork chamber may be heated up to a temperature of between 750° and 850° C. by the combustion of carbonaceous materials, either in the gaseous or pulverized state; fine or coarse carbon particles of semi-coke may be introduced into the adjacent reducing chamber; and a current of gas containing CO_2 (and which may be produced, as aforesaid, by so-called chemical condensation) be passed into the chamber containing the chequerwork. The gas is heated by direct contact with the chequerwork to the necessary reaction temperature; and the heated gas on passing through the reducing chamber is reduced to CO in the presence of the semi-coke therein.

It will be understood that the quantity of chequerwork and the heat-carrying capacity thereof can be so adjusted as to leave a surplus of so-called sensible heat, after providing for the endothermic reactions due to the reduction of the CO_2, so that the CO may still leave the reduction chamber at a temperature sufficiently high to allow it to be employed for the distillation of carbonaceous materials in any well-known type of retort.

After the sensible heat of the reduced gas has been utilized for distillation purposes, the CO mixed with the retort gases—*i.e.*, the volatile constitutents set free in the form of oils or tarry vapours—may be conducted through a condensing or scrubbing plant of any well-known type, and freed from the vapours, while the residual gas may afterwards be recirculated through the chequerwork chamber or a separate chamber, in order to reduce to CO the further quantity of CO_2 obtained by the distillation process. The gas may after preheating, if necessary, be again recirculated as before, or the gas, or a surplus volume thereof, may be conducted away for use either as town gas or for industrial purposes.

Should it be desired to increase the heating value of such gas, the whole or part of the oil or tarry vapours carried away by the heating gas from the distillation retort may be conducted through an oil cracker, which may form part of the chequerwork reduction chamber, and be of a somewhat similar construction.

There follows in the specification a further explanation with reference to a suggested form of apparatus; but the latter does not feature in the claims.

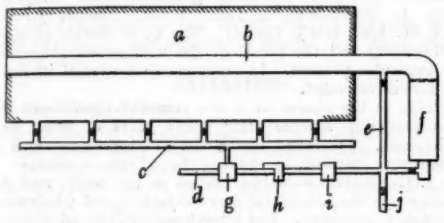
Retort Furnaces.—No. 263,269.

CARR, W. M., of Stretford, TOOGOOD, H. J., and DEMPSTER, R., & SONS, LTD., both of Elland.

No. 27,972; Nov. 6, 1925.

This invention relates to the heating arrangements of the furnaces of retorts for the carbonization of coal, and particularly to arrangements employing part of the coal gas for heating purposes, and in which the waste gases pass through a waste-heat boiler. The object of the invention is to provide improved arrangements for mixing waste products of combustion with the coal gas employed in the furnaces for the purpose of obtaining complete combustion of the coal gas and proper distribution of the heat over the retort surfaces without depositing carbon or lamp black such as would interfere with heating, lower the rate of heat transference through the walls, and accumulate in the flues.

The pressure of the waste products of combustion at the outlet of the waste-heat boiler fan is utilized to mix a proportion of said products with the straight gas from the retort.



Thus, in the diagram we reproduce, the setting is indicated at *a*, and the waste-products flue at *b*. The main for supplying the gas for the gaseous firing of the setting is indicated at *c*. The supply for *c* is obtained partly from the coal-gas supply branch *d* and partly from the waste products flue *b* by way of the waste-heat boiler *f* and fan or exhauster *h*. A gas mixer may be provided at *g*, and a dust trap and cooler for the waste gas at *i*. A producer gas connection may be provided at *j*. Suitable control valves are fitted where required for regulating the flow of the gases or gaseous mixture to suit requirements. Some of the gas from the boiler *f* may be mixed with waste gases from the by-pass connection *e*.

The amount of waste products with, if desired, producer gas employed relatively to coal gas while ensuring freedom from the lamp black deposits may be sufficient to reduce the calorific value of the mixture to between 130 and 250 B.Th.U. per c.ft.

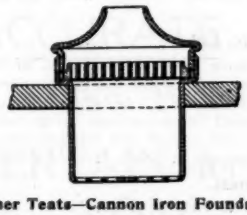
Teats for Gas Burners.—No. 263,335.

CANNON IRON FOUNDRIES, LTD., and HAWTHORNE, H. S., both of Deepfields.

No. 3969; Feb. 11, 1926.

This invention relates particularly to atmospheric burners for gas fires. It is usual in such fires to fit the outlet apertures of the burner tubes with removable nozzles combined with perforated traps which extend into the interior of the burner tubes and serve to arrest solid particles. Hitherto the nozzles have been made integrally with, or permanently secured to, the trap portions; these two parts virtually forming a single piece. Consequently difficulty is experienced in cleaning-out accumulated dirt. It has also been proposed to effect a detachable screw-thread connection between the nozzle and the trap portion; but this is inconvenient.

According to the present invention the nozzle is attached to the trap by a free sliding connection enabling the parts to be readily separated for cleaning purposes.



Gas Burner Teats—Cannon Iron Foundries, Ltd.

The drawing which we reproduce clearly shows the construction of the teat, with a perforated disc held between the spigot and the socket portions.

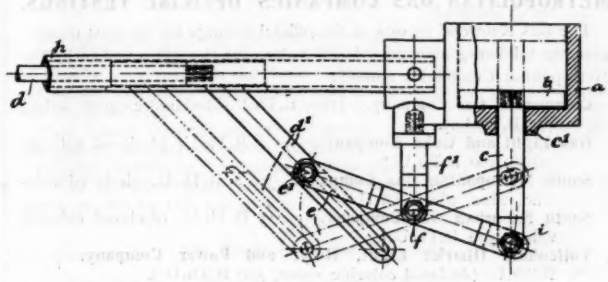
Cement Gun for Retorts.—No. 263,419.

MILBOURNE, R. J., of Lilleshall, and POULSON, C., of Stafford.

No. 18,964; July 29, 1926.

This invention relates to a tool for repairing holes or cracks in gas retorts; and according to the invention the piston-rod is controlled by a rod sliding longitudinally along the handle of the tool and operable by hand.

In the sectional elevation which we reproduce, *a* is the cylindrical vessel for the reception of the plastic fireclay or other repairing medium, having an open end designed to be applied to the inner surface of the retort. *b* is the plunger fitting, and *c* is the piston-rod passing through a guide-hole c^1 in the closed end of the cylinder. *d* is the rod for reciprocating the piston *b* in the cylinder *a*, through the medium of the double-armed lever *e* fulcrummed at *f* to a support f^1 on the receptacle *a*. This rod is provided at one end with a handle, and slides within the tubular guide *h* rigidly connected to the receptacle; and it carries at its other end the angled extension d^1 which



Retort Gun—Milbourne and Poulson.

is slotted to engage a pin e^1 on one end of the lever *e*. The other end of this lever is forked to embrace the piston rod *c*, and slotted to engage with a pin *i* carried at the end of *c*.

The tubular guide *h* may be fitted with a suitable support or roller carriage, to enable the operator to hold up the tool in the required position more easily.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Jan. 12.]

Nos. 1—622.

BREGEAUT, L.—"Gas producing apparatus." No. 495.
DAVIS ENGINEERING COMPANY, LTD., and DAVIS, W. J.—"Geysers." No. 78.
DOLPHIN, J.—"Automatic valves for regulation of gas supply." No. 451.
DUCKHAM, A. M.—"Manufacture of coke." No. 128.
GASMESSERFABRIK MAINZ ELSTER & CO.—"Gas meters." No. 163.
HOWLETT & CO., LTD., M.—See Dolphin, J. No. 451.
I. G. FARBENINDUSTRIE AKT.-GES.—"Drying gases." No. 54.
I. G. FARBENINDUSTRIE AKT.-GES.—"Production of valuable products from coal, tars, &c." No. 114.
JOHNSON, J. Y.—See I. G. Farbenindustrie Akt.-Ges. Nos. 54, 114.
KENNETT, J. S.—"Steam generating coal gas retorts." No. 190.
LEAD WOOL COMPANY, LTD.—"Packing for spigot joints." No. 58.
SIMPSON, S.—"Coin-freed mechanism of gas meters." No. 454.
STEWARTS & LLOYDS, LTD.—"Lining iron pipes." Nos. 46, 47.
WILSON, F. C.—"Gas meters." No. 89.
WOODALL-DUCKHAM (1920), LTD.—See Duckham, A. M. No. 128,
YATES, H. J.—See Dolphin, J. No. 451.

[Extracted from the "Official Journal" for Jan. 19.]

Nos. 623—1303.

DONALD, W.—"Carbonization of coal, &c." No. 787.
JONES, F.—"Control of taps for lighting." No. 1074.
LESSING, R.—"Separation of powdered coal." No. 856.
METERS, LTD.—"Gas meters." No. 1299.
SIDES, H.—See Meters, Ltd. No. 1299.
SMITH, E. W., and SMITH METERS, LTD.—"Gas meters." No. 724.

LEGAL INTELLIGENCE.

A Rating Principle.

An important point regarding sinking fund and interest deductions for valuation purposes has been decided in the Scottish Valuation Appeal Court, as the result of an appeal by the Aberdeen Electricity Department. The appeal was against the refusal of the Valuation Committee to deduct, when fixing the value of the undertaking, sums of £6971 and £419, in respect of sinking fund and interest on capital expenditure on buildings and plant before these were completed and became revenue producing subjects. The Court held that the determination of the Valuation Committee was correct. Lord Sands said it appeared that it had hitherto been customary in Aberdeen, in valuing this and similar undertakings, not to make any deduction from the annual value as ascertained by the application of the revenue principle in respect of annual expenditure by way of payment of interest and sinking fund charges upon the money borrowed for unfinished and unproductive works. In considering the application of the revenue principle, it was necessary to keep in view that the question was not one as to the purpose to which the net revenue was applied or of profits or gains, but solely of the annual value of the subjects the value of which, if they were let, would be spent in rent paid by a tenant. The revenue principle professed to ascertain this. From the gross revenue were deducted all outlays which a tenant would have to incur, including rates and interest on working capital, &c., and also depreciation. A further deduction was made in respect of tenants' profits—*i.e.*, the profits which a tenant would look to earn if he was to be induced to carry on the business. The balance of the revenue after these deductions were made was taken to be the amount of the rent which the tenant, as was supposed, would be willing to pay the landlord for the works. No question in regard to the manner in which the rent so paid was applied by the landlord entered into the matter. This did not concern the tenant, who would not be induced to offer a higher rent in respect of any burdens imposed upon the proprietor.

MISCELLANEOUS NEWS.

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The Gas Referees' reports of the official testings for the past quarter give the following average calorific values for the gas supplied by the Metropolitan Companies named:

Commercial Gas Company.—478·9 B.Th.U. (declared calorific value, 475 B.Th.U.).

Gas Light and Coke Company.—501·4 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—562·8 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—501·5 B.Th.U. (declared calorific value, 500 B.Th.U.).

Tottenham District Light, Heat, and Power Company.—501·7 B.Th.U. (declared calorific value, 500 B.Th.U.).

Wandsworth, Wimbledon, and Epsom District Gas Company.—From Oct. 1 to Dec. 19, 457·9 B.Th.U.; from Dec. 20 to Dec. 31, 469·1 B.Th.U.; and for the quarter, 459·4 B.Th.U. (declared calorific value, 470 B.Th.U.). On no day in the quarter was the calorific value at any testing place found to be deficient by 6 p.ct. or more, except on Sunday, Oct. 24, when the calorific value at the testing place at 2A, Disraeli Road, Putney (which is supplied with gas from the Wandsworth Works of the Company), was found to be deficient by 6·04 p.ct. for a period of two hours or upwards.

JOHANNESBURG NEW GAS-WORKS.

British Tenders Lowest.

Cabling last Wednesday, the local correspondent of the "Daily Mail" said that "the outstanding feature of the tenders received for the new gas-works of the Johannesburg Municipality is the fact that the British tenders are lower than the German. The difference between even the highest British tender and the cheapest German is considerably in favour of the British offer. The tenders range from £153,160 to £266,968. Firms who tendered are: Bruce Peebles & Co., Ltd., Edinburgh; Drakes, Ltd., Halifax; Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., London; West's Gas Improvement Co., Ltd., Manchester; Julius Pintsch, A.-G., Germany; Francke Werke, A.-G., Germany; Aug. Klönne, Germany; and the Skoda Works, Prague."

As announced in the "JOURNAL" for Jan. 5, Mr. W. R. Herring has been selected to assist the Council to adjudicate upon the tenders; and he left England for the purpose last Friday.

INQUIRY AT BANGOR (CO. DOWN).

New Glover-West Verticals Proposed.

Some striking figures were disclosed before Mr. JOHN BATES, Engineering Inspector for the Ulster Ministry of Home Affairs, at an inquiry into the Bangor Urban Council's application for a Provisional Order increasing their borrowing capacity in respect of the gas undertaking by £19,000 for the purpose of installing additional vertical retorts and other plant.

Mr. WILLIAM SCOTLAND (Assistant Gas Manager) said the present plant consisted of twenty retorts. During the present winter they had been exceeding the safe working load of 600,000 c.ft.; the maximum load per day being as high as over 700,000 c.ft. The manufacture of gas for the year ended March 31, 1926, totalled 172,360,000 c.ft. The proposed extension would consist of two benches comprising eight Glover-West vertical retorts, with retort house extension, engine house, extractor gears with driving engines in duplicate, and extension to the existing coal-handling plant, including excavations and foundations for the installation, together with the provision of a natural draught waste-heat boiler and steam engine driven lift. The extension comprised the latest improvements; and the eight retorts would be capable of producing the same quantity of gas as the whole of the existing plant of twenty retorts. It was estimated that there would be an actual saving of from £850 to £950 a year over the present plant. To show the growth of the undertaking, it was stated that in the year ended March 31, 1881, the manufacture of gas was 1,194,000 c.ft. The price was 5s. per 1000 c.ft., and there were 121 consumers. In 1926 the production had increased (as already stated) to 172,360,000 c.ft.; and the price was 3s. 6d. per 1000 c.ft., the number of consumers 3625, and the stoves on hire 2365. For the year ending March 31 next, the output had been so far 193,000,000 c.ft. The manufacture of gas had more than trebled since 1914.

The INSPECTOR commented on the small increase in the price of gas which was made during the coal strike, saying that 4s. 2d. per 1000 c.ft. was very low. He supposed that gas was cheaper in Bangor than in any other town in Ireland, except Belfast.

Mr. SCOTLAND: Belfast is the only town or city where it is cheaper.

Gas Light and Coke Company's Dividend.—The accounts of the Gas Light and Coke Company for the past year show that, subject to audit, the balance to the credit of the net revenue account will enable the Directors to recommend the payment of dividends for the half-year to Dec. 31 last as follows: On the 4 p.ct. consolidated preference stock, at the rate of 4 p.ct. per annum; on the 3½ p.ct. maximum stock, at the rate of 3½ p.ct. per annum; and on the ordinary stock, at the rate of 5 p.ct. per annum, carrying forward to the next account the sum of £64,646 17s. 7d.

CO-PARTNERSHIP AT HASTINGS.

A system of co-partnership was formally inaugurated in connection with the Hastings and St. Leonards Gas Company at a special meeting of Directors, employees, and their relatives, held in the Hastings Pier Pavilion on Tuesday, Jan. 18.

The scheme has already been tried in the Company in a tentative manner—in fact, there are already about 200 employees actually participating. The matter is now put on a definite basis by the election of a Committee to represent the co-partners' interests. An employee who is admitted under this scheme will receive in the form of a bonus the percentage difference between the standard dividend of the Company and the dividend actually paid. All employees over the age of 21 years are eligible for membership as co-partners, subject to the approval of the representative Committee elected to administer the scheme.

The Directors present at the meeting were Messrs. W. J. Glenister (Chairman), J. Macer-Wright, J.P., A. D. Thorpe, J.P., H. H. Moppett, A. M. Apel, and J. Lockey. Mr. C. F. Botley (Engineer and General Manager) and the heads of the various departments of the Company were also present. In response to a special invitation, the Bishop of Lewes attended.

Mr. BOTLEY, in the course of a few remarks, welcomed the dawn of the co-partnership scheme after many years of delay and unexpected difficulties. He relied on all the employees to show that his faith in them was justified, by making the scheme a success.

Mr. W. J. GLENISTER was then elected to the chair, and Mr. Apel was nominated as the Directors' representative, and Chairman of the Co-Partnership Committee. The other members elected were: Messrs. A. Coote, W. T. Mills, G. Horne, D. Morrissy, J. Tanner, G. Willett, J. F. Beney, H. Balcombe, H. Pattenden, and F. Marsden. Mr. A. D. Thorpe consented to act as Director-Trustee. Two other trustees remain to be appointed by the Committee.

Mr. APEL declared that co-partnership offered the surest, best, and fairest way out of much of the industrial unrest that had been prevalent during the last year or two. Co-partnership must not be confused with ordinary profit-sharing, which generally meant the picking up of a bonus on wages at the end of the year. Co-partnership was a plant of slow growth, which would continue to grow as the years went on. The gas industry was eminently suitable for adopting the plan. In no other industry in the whole of the country were the interests of the consumer so well looked after by the law. The Company were only allowed to pay a limited dividend, according to a sliding-scale, and they could not make their profits greater without first reducing the price of gas to the consumer. It was in this direction that he looked to the co-partners to work together for success, which would depend mainly on comradeship, progress, and efficiency. Team work would pull them through. Mr. Apel added that he saw nothing in co-partnership that was contrary to the higher ethics of the Trades Union movement. If it stood for the general uplift of the workers, it should be received sympathetically by every Trade Union in the land.

TRADE NOTES.

The Practical Year Book and Diary.

Messrs. W. G. Beaumont & Son, of Bow, have forwarded a copy of their Practical Year Book and Diary for 1927. For many years the firm have specialized in the painting of iron, steel, and wood structures.

The "L. & N." Optical Pyrometer.

The Integra Company, Ltd., of No. 183, Broad Street, Birmingham, referring to Mr. S. Hole's paper on "Methods of Measuring Temperature," published in the "JOURNAL" for Jan. 19, inform us that they are the sole British representatives for all Leeds and Northrup material.

Le Bas Tube Company, Ltd.

This Company have produced a series of compound discount tables which should be very useful for the purchase of such building and engineering materials as are bought on standard lists, and discounts which are varied in accordance with conditions. Copies of this list are available for any of our readers who are interested, on application to the Company at Dock House, Billiter Street, E.C. 3.

Two Booklets of Interest.

Messrs. Stewarts & Lloyds, Ltd., have issued two booklets of value to the gas engineer, and to those interested in the laying of steel gas and water mains. One consists of tables of the net prices of screwed and socketed tubes and fittings. These tables give the net prices at discounts of from 20 to 80 p.ct. at 1¼ p.ct. intervals. The other booklet comprises tables of capacities and properties of steel tubes. It contains formulæ, tables, and charts enabling the problems which arise in the use of steel tubes to be solved readily and with the minimum of calculation. Readers who have not been supplied with a copy of either are invited to communicate with Messrs. Stewarts & Lloyds, Ltd., Publications Dept., 41, Oswald Street, Glasgow, C.1, quoting the reference "H."

Large Railway Orders for British Firm.

The Great Southern Railway of Ireland, the principal Railway Company in the Free State, have decided to equip their main line depôts at Inchicore, Ballybrophy, Limerick, and Cork with water-softening installations of the most modern and scientific type, and have placed the entire order for this work with a British firm, United Water-Softeners, Ltd., of London. The provision of softened and purified water for the locomotives throughout the system will effect substantial economies in respect of fuel consumption and repair bills,

and will render possible a great increase in engine mileage between cleanings. The Sudan Government Railways and the Great Indian Peninsula Railway have also placed orders for softening installations with United Water Softeners, Ltd. The softener adopted in all three cases is the well-known Lassen-Hjort lime-soda system, already used on British railways.

CONTRACTS OPEN.

Pipes and Specials.

The Gas Department of the County Borough of Burnley are inviting tenders for the supply of cast-iron pipes. [See advert. on p. 211.]

Coal.

Tenders are invited by the Gas Committee of the Plymouth Corporation for the supply and delivery of gas coal. [See advert. on p. 211.]

Fireclay and Silica Goods.

The Loughborough Gas Committee are inviting tenders for resetting retorts. [See advert. on p. 211.]

The Gas Committee of the Manchester Corporation are inviting tenders for the supply and delivery of fireclay and silica goods. [See advert. on p. 211.]

EXTENSIONS.

Clitheroe Gas-Works Scheme.

A scheme for the reorganization of the Clitheroe Gas-Works has been decided upon; and at the Town Council on Jan. 18 the Manager (Mr. R. Barrett) was authorized to secure estimates for work to bring the equipment up to date. Among the improvements will be an electric generating plant to operate the whole of the machinery. A petrol locomotive is to be added, and the sidings will be extended. Storage capacity will be increased by 500,000 c.ft.; and a new retort house and carbonizing plant will be provided capable of producing 850,000 c.ft. of gas a day.

Reduction in Price at Barnstaple.—The Directors of the Barnstaple Gas Company have decided to reduce the charge for gas to 4s. 8d. per 1000 c.ft. as from the date of reading meters for the quarter ended December last, thus reverting to the price obtaining prior to the coal stoppage. Consumers will therefore have used gas for one quarter only at the higher rate.

Ascot Preference Share Issue.—An issue of 3000 £10 6 p.ct. irredeemable preference shares in the Ascot District Gas and Electricity Company is being made by Messrs. A. & W. Richards on behalf of the Directors; the minimum price being par. Extensions into new areas and agreements for bulk supplies necessitate the raising of this further capital. Tenders are to be sent to the firm at 37, Walbrook, London, E.C. 4, not later than 11 o'clock on Friday, Feb. 4.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 24.

Tar products generally remain unchanged.

There is a moderate amount of inquiry for pitch, and the price is nominally 130s. per ton net f.o.b. Thames.

Creosote continues scarce and steady at about 9d. to 9½d. per gallon net f.o.b. steamer.

Pure toluole is about 2s. 6d. per gallon, pure benzole about 2s. 3d. per gallon, and 95/160 solvent naphtha 1s. 11d. to 2s. per gallon.

Crystal carbolic acid is quiet at about 6½d. per lb. f.o.b.

There is rather more inquiry for pyridine, the price of which is about 9s. 6d. to 10s. per gallon.

Tar Products in the Provinces.

Jan. 24.

Markets for tar products remain steady.

In pitch no business of importance has been reported during the past week. There is little inquiry on the market; but consumers do not feel inclined to purchase at the prices asked.

Creosote is steady.

The average values for gas-works products during the week were: Gas-works tar, 88s. 6d. to 93s. 6d. Pitch, East Coast, 120s. to 125s. f.o.b. West Coast—Manchester, 115s. to 120s.; Liverpool, 117s. 6d. to 122s. 6d.; Clyde, 120s. to 123s. 6d. Benzole, 90 p.ct., North, 1s. 9½d. to 1s. 10½d.; crude, 65 p.ct. at 120° C., 1s. 3d. to 1s. 4d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 10½d. to 1s. 11½d. Toluole, naked, North, 1s. 9d. to 1s. 10d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 9½d. Solvent naphtha, naked, North, 1s. 7d. to 1s. 8d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 8¼d. to 8¾d.; salty, 8d. to 8¼d.; Scotland, 8d. to 8¼d. Heavy oils, in bulk, North, 8¾d. to 9d. Carbolic acid, 60 p.ct., 1s. 9½d. to 1s. 10½d. prompt. Naphthalene, £11 to £14; salts, 100s. to 110s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

"Sale" at Leamington.—From Jan. 24 to 29, the Leamington Priors Gas Company are holding a sale; all fittings and appliances being sold at reduced prices.

Commercial Gas Company's Dividend.—The Directors of the Commercial Gas Company will recommend at the annual general meeting to be held on Feb. 17 the payment of dividends for the half-year to December last at the rates of £5 6s. 8d. p.ct. per annum on the 4 p.ct. stock, and £5 3s. 4d. p.ct. per annum on the 3½ p.ct. stock, both less income-tax. The dividends for the first half of the year were at the same rates.

POSITIVE RECORD

GAS CALORIMETER

(Simmance's Patent)

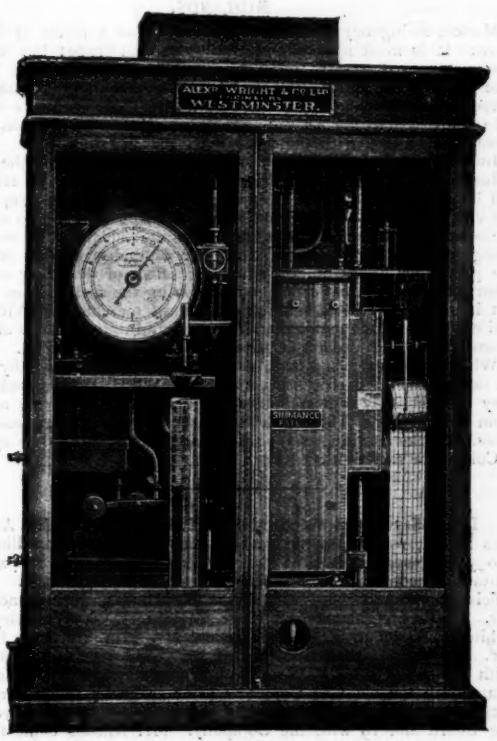
ACCURATE

No Water Troubles.

CERTAIN for a LONG RUN without attention.

A PERFECT TEST INSTRUMENT.
A PERFECT RECORDING MACHINE.
AN AUTOMATIC TESTER.

Maintenance Expense Avoided.



ALEXANDER WRIGHT & CO., Ltd., Westminster, S.W. 1

Telephone: VICTORIA 1207. Telegrams: PRECISION, SOWEST, LONDON.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There has been a slightly better tendency during the past week in Durham coking coals and steams for bunkering, though gas makes have shown little change. The improvement has come chiefly from demand for prompt shipments, buyers still showing no signs of wishing to contract ahead at the prices which collieries are indicating. Inquiries continue to come from abroad; but offers made by export merchants, based on colliery quotations, are invariably met by counter-offers at considerably lower prices. Forward business, therefore, is not maturing at all satisfactorily.

Wear Specials and best quality gas are both nominally 18s. 6d. f.o.b.; but prices for prompt cargoes are subject to negotiation, according to colliery positions. Second-class gas are quoted, as a rule, 16s. 6d., but have been obtainable as low as 15s. 6d. Durham coking is quoted 18s. to 18s. 6d., and there has been something of a run in this department for several large cargoes during the week. Coking coals still appear to have the best prospects. Bunkers have been in slightly better demand, and are quoted about 18s. for best makes.

Gas coke for shipment is about 23s. f.o.b., and patent foundry 25s.

YORKSHIRE AND LANCASHIRE.

The severe weather recently experienced is expected to increase the demand for domestic fuel, business in the northern counties not having been brisk since the reopening of the coal mines. The majority of householders have been purchasing in much smaller quantities than hitherto, although there has been a fair demand from the metropolitan area.

Industries are slow in recovering from the recent stoppage, and it seems that it will be some time before anything like normal conditions prevail in this direction. It is reported that during February there may be some advance in the production of coke, which will materially affect the situation. Prices vary in accordance with the forward position at each particular pit, with no stabilized figures for any description of coal.

Gas coals are firm, and appear likely to remain so throughout the winter. Contracts, generally speaking, are being kept up to date. There is little or no current business moving except some trials with a view to future contracts.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, 22s. 3d. to 22s. 9d.; screened gas, 24s.; washed doubles, 25s. to 25s. 6d.; washed singles, 21s. to 21s. 3d.; washed smalls, 14s. 6d.; rough slack, 13s. 6d. to 14s.; smithy peas, 24s. to 27s. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 22s.; screened gas, 23s. to 23s. 6d.; washed doubles, 22s.; washed singles, 21s.; washed smalls, 13s. 9d. to 14s. 3d.; unwashed doubles, 19s. to 19s. 6d.; rough slack, 14s.; coking smalls, 11s. to 12s. per ton. Derbyshire and Nottinghamshire—Top hards, 23s. to 25s.; washed doubles, 23s. to 24s.; washed singles, 21s. to 21s. 3d.; washed smalls, 14s. 6d.; rough slack, 13s. 6d. to 14s. 6d. Yorkshire, Derbyshire and Nottinghamshire—Screened steam coal, 20s.; gas coke, 32s. 6d.; furnace coke, 26s. 6d. to 27s. 6d. per ton.

MIDLANDS.

Market stringency has quickly developed as a result of frost and snow. It is most apparent in the house coal trade; but in present circumstances it reacts upon business in industrial fuel likewise. The position is that while pits have been making a considerable output, it has been going into consumption. Householders have held off the market as far as they could, and the cold snap has brought them face to face with the realities of the situation.

Industrialists may have put off making contracts in the hope of a further fall in prices; but inasmuch as they have no reserves to fall back upon, they have been competing for a large proportion of the current output. They, too, are in a better position to appreciate the situation of the collieries now that the adequacy of supplies is being put to the test. The newspaper campaign carried on against the prevailing prices not only had the effect of deterring consumers from providing against contingencies during the spell of open weather, but it necessarily increased the caution of merchants. With a sudden expansion of demand, the latter now find that collieries are unable to entertain their orders, in some cases for weeks ahead.

While prices are very firm, there has been no noteworthy increase so far as the collieries are concerned. With a stimulated demand they are naturally less anxious for the moment about the abstention from contracting. There is a steady business in steam coals at late rates. Slacks continue easy; sales being effected at 9s. to 13s.

Cokes are still tight.

Long Service at Accrington.—Five officials of the Accrington Gas Board, retiring on superannuation after service totalling nearly 200 years, were guests of their colleagues, on Jan. 12, when presentations were made as tokens of esteem and goodwill. The ex-officials honoured were Mr. Wm. B. Rhodes, former accountant, Mr. R. T. Holgate, rental clerk, Messrs. J. E. Walmsley and J. Whitehurst, slot meter collectors, and Mr. Wm. Barnes. Excepting Mr. Whitehurst, with a record of 27 years' service, all have been with the Board since its formation 32 years ago, and also for several years with the old Gas Company prior to being taken over by the local authority. Mr. Holgate had the longest service—32 years with the Board and 19 with the Company. Mr. Rhodes came next with 41 years, followed by Mr. Walmsley with 40 years' service, and Mr. Barnes with 38 years. Alderman D. C. Dewhurst, Chairman of the Board, presided, and was supported by the officials. The presentation to Mr. Rhodes consisted of a diamond tie pin. Mr. Holgate received an umbrella, a letter case, and a fountain pen, Messrs. Walmsley and Whitehurst smokers' cabinets, and Mr. Barnes a case of pipes and a walking stick.

Cheaper Gas at Canterbury.—The Canterbury Gas and Water Company announce that, as from the reading of the meters for the last quarter, the price of gas is to be reduced by 1·8d. per therm, which is equivalent to the 15 p.ct. increase made during the coal stoppage.

Gas Explosion at Manchester.—Escaping gas from a main at Beswick, Manchester, which had been fractured through a subsidence of the soil, found its way into some houses, and two explosions resulted which caused considerable damage to property and slight injury to one of the tenants.

Stoke-on-Trent Corporation (Gas) Bill.—A statutory meeting of the Stoke-on-Trent electors held last Friday approved the promotion of the Stoke-on-Trent Corporation (Gas) Bill. The object of the Bill is to empower the Corporation to lay a gas main through Wolstanton, in order to connect up the Etruria and the Longport gas-works. This forms part of the scheme for the amalgamation of the various gas undertakings in the city, and the centralization of manufacture at Etruria. The estimated cost of connecting the Etruria and the Longport works, including the acquisition of land, &c., and the laying of the main, is £14,500; and it is proposed to borrow this amount, spreading the repayment over a period of twenty years. The Council have since met, and have passed the requisite confirmatory resolution in favour of promoting the Bill.

Institution of Fuel Technology.—On Jan. 15 the Institution of Fuel Technology was registered as a company limited by guarantee and not having a capital divided into shares, to promote the general advancement of the various branches of fuel technology, and as a means for furthering the more efficient production and scientific and economic utilization of fuel of all kinds. The management is vested in a Council which includes: Sir Alfred Mond, M.P., Lord Aberconway, K.C., Prof. H. B. Dixon, Sir Robert A. Hadfield, Col. Sir William R. Smith, M.D., D.Sc., Lord Weir, Sir D. Milne Watson, Mr. R. A. Burrows, Sir Philip Dawson, M.P., Mr. F. A. Freeth, Sir W. J. Larke, Dr. R. Lessing, Mr. M. Mannaberg, Sir Edward Manville, M.P., Mr. S. McEwen, Lord Montagu of Beaulieu, Sir Richard A. S. Redmayne, Admiral Sir Edmond Slade, and Sir William Barclay Peat. The registered office is at 202, Abbey House, Victoria Street, Westminster, S.W. 1.

Ewart & Son, Ltd.—In their report for 1926, the Directors state that the business of the Company has been maintained in spite of the industrial difficulties of the year, and that the profit is in excess of that of the previous year. They therefore recommend that dividends be paid at the same rates as last year, and that the carry-forward be increased. The net profit amounted to £55,822, making, with the sum brought forward, £62,569. Dividends on the 16 p.ct. cumulative preference shares absorbed £16,112; and the interim dividend of 16 p.ct. on the ordinary shares, less income-tax, paid on June 30, accounted for £7899. The balance is £38,558; and the Directors recommend that this should be dealt with as follows: In payment of a final dividend of 25 p.ct. on the ordinary shares, payable, less income-tax, on March 1 (making, with the interim dividend already paid, 41 p.ct. for the year), £12,342; in payment of a dividend on the management shares, of a like amount and on the same date, £12,342. This will leave £13,873 to carry forward.

Lecture at Leamington.—On Jan. 20, Mr. Stringer, of Messrs. John Wright & Co.'s Technical Staff, gave a lecture to the staff of the Leamington Priors Gas Company, entitled "Heating and Ventilation of Large Buildings and Flueless Rooms." The subject was examined with special reference to the self-contained gas-heated radiator, and a résumé was given of the available methods of heat transmission and the general principles involved in the heating of large buildings. The advantages to be obtained from the employment of self-contained gas-heated radiators were thoroughly demonstrated, and later there was a description of typical appliances of this nature, with an examination of their construction and application under various conditions. The evils of inefficient ventilation, with regard to both the effect upon the occupants of the room and the bearing on the possibility of production of carbon monoxide by gas-consuming appliances, formed an interesting part of the lecture. At the close, the importance of efficient ventilation was emphasized, and interesting details were given of the means available for the determination of the purity of room atmosphere.

Proposed Increased Railway Rates.—The following resolution was passed on Jan. 21 by a Special Committee of the British Engineers' Association: The British Engineers' Association deplores the policy of the Railway Companies in proposing to increase the burden of railway rates to be borne by industry and trade in their present state of depression, and at a time when they are struggling to recover from the serious effects of their recent dislocation. The engineering industry, like most other producers, is working on very small margins, with the object of recovering trade; and in these circumstances it is thought to be most unfair that railway rates should be increased without at least three months' notice being given to enable the manufacturer to avoid or minimize this new encroachment on his margins in respect of existing contracts. The daily experiences of manufacturers and traders in this country make it abundantly clear that considerable railway economies could be effected; and it is strongly felt that the possibilities of such economies should be thoroughly investigated before a further handicap is placed on industry and trade by any such increase of railway rates as is now threatened.

The Coventry Corporation Bill is being objected to by the Kenilworth Urban District Council, particularly with regard to the purchase by the City Council of the local gas undertaking.

The London County Council Education Committee have accepted tenders for improved gas lighting in a number of schools, to be carried out by the Gas Light and Coke Company, the South Metropolitan Gas Company, and Messrs. William Sugg & Co., Ltd.

STOCK MARKET REPORT.

THE outstanding feature of the past week was the allotment of the new 4 p.ct. Consols. The cash applications had been estimated at about £40,000,000, whereas the actual amount applied for exceeded twice that amount; and the total, including the conversions, amounted to £209,358,889. Dealings in the new stock commenced at ¾ premium.

On the Exchange a fairly busy week was experienced. Gilt-edged stocks were slightly easier, influenced doubtless by the profit-taking on the new Consols, the approaching Nigerian 5 p.ct. loan to be issued at par, and by the absence of the anticipated Bank Rate reduction.

Foreign stocks were steady, and there is no movement of importance to record. In the Industrial Market the most talked of event was the reaction of Imperial Tobaccos. The definite rumours of the previous week forecasting an improvement in the rate of dividend having failed to materialize, large parcels were placed on the market, with the inevitable result. A rumour of a working agreement between Courtaulds, the Snia Viscosa, and the German company also attracted considerable attention; and the prices of the first two undertakings rose rapidly.

In the Gas Market a number of stocks were marked up, indicating that the dealers have confidence in a further improvement. British 5 p.ct. maximum, Commercial 4 p.ct., Liverpool 5 p.ct., and South Metropolitan ordinary were among the number. Inquiries showed that stocks were difficult to acquire except at top prices. The first of the dividends for the past half-year to be announced are the Gas Light and Coke, with a recommendation of their first "minimum" dividend under the 1926 Act of 5 p.ct. per annum, and the Commercial Company £5 6s. 8d. p.ct. per annum on the 4 p.ct. stock, and £5 3s. 4d. p.ct. per annum on the 3½ p.ct. stock. The former Company is 1s. 4d. down on the year as compared with 1925; but there is no change in the rates recommended by the Commercial Company.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 82⅜, 83, Bournemouth "B" 12⅝, 6 p.ct. preference 11⅛, 4 p.ct. debenture 75½, Brighton and Hove 10 p.ct. 166, "A" 127, European 6½, Gas Light and Coke 86⅝, 86⅞, 87½, 87⅝, 4 p.ct. preference 76¼, 76½, 3 p.ct. debenture 58¾, Imperial Continental 132, 132½, Liverpool 7 p.ct. preference 101, Oriental 101, 102, Primitiva 14s., 14s. 1½d., 14s. 3d., 14s. 6d., South Metropolitan 95, 95¼, 95⅜, 3 p.ct. debenture 58, South Suburban 5 p.ct. 98½, Tuscan 21s. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 99½, Hornsey 5 p.ct. preference 85.

On Tuesday, Alliance and Dublin 82½, 83, Brighton and Hove 10 p.ct. 166, British 106½, Colonial 8 p.ct. preference 21s. 4½d., European 6½, Gas Light and Coke 86⅝, 86⅞, 87½, 87½, 4 p.ct. preference 76⅜, 3 p.ct. debenture 59⅜, 6 p.ct. Brentford debenture 102, Imperial Continental 131½, 131⅞, 132, Oriental 101, 102, Primitiva 14s. 1½d., 14s. 3d., 14s. 4½d., 14s. 6d., South Metropolitan 95, 96, South Suburban 98½, 90½.

On Wednesday, Alliance and Dublin 82, 82⅜, Commercial 4 p.ct. 83½, 85, 3½ p.ct. 82½, Gas Light and Coke 86½, 86⅝, 86⅞, 87, 87⅛, 87½, Newcastle and Gateshead 3½ p.ct. 70½, Primitiva 14s. 3d., 14s. 4½d., 14s. 6d., 14s. 7½d., 14s. 9d., 15s., 4 p.ct. debenture (1911) 72, 72½, South Metropolitan 95, 96, South Suburban 5 p.ct. 99, 99½, 5 p.ct. debenture 95½, Swansea 7 p.ct. preference 101½, Tottenham "B" 92. Supplementary prices, Croydon 7½ p.ct. preference 103, 104, Eastbourne 3½ p.ct. "B" 103, Gas Light and Coke 5 p.ct. debenture 99½.

On Thursday, Alliance and Dublin 83½, British 106, 106½, 106⅝, 4 p.ct. debenture 68, Croydon sliding-scale 98, 90, Gas Light and Coke 86¼, 86⅜, 86⅞, 87, 6 p.ct. Brentford debenture 102⅜, Imperial Continental 131⅜, Primitiva 14s. 6d., 14s. 7½d., 14s. 1 ½d., South Metropolitan 95, Southampton 5 p.ct. maximum 76½. Supplementary prices, Cape Town 5 p.ct. debentures 70, 71, Liverpool 5 p.ct. 79½, Metropolitan (Melbourne) 9⅝, Reading 5 p.ct. 90.

On Friday, Aldershot 4 p.ct. preference 70, Commercial 4 p.ct. 82¼, 3½ p.ct. 81½, 82½, European 6½, Gas Light and Coke 86½, 86¼, 86⅞, 87, 3 p.ct. debenture 50, 50½, Imperial Continental 131, 131⅜, Primitiva 14s. 6d., 14s. 7½d., 14s. 10½d., South African 80s., South Metropolitan 95½. Supplementary prices, Gas Light and Coke 5 p.ct. deb. 90½, 99½.

Discount rates in Lombard Street were slightly firmer towards the close of the week, notwithstanding that Treasury Bills were allotted at a slightly lower price than was anticipated. The average rate was £4 2s. 4·47d. p.ct., a fall of 1s. p.ct. on the previous week.

The feature of the Foreign Exchange Market was the weakness of Dutch guilders and German marks. The Amsterdam rate advanced to 12.14½, and the Berlin rate to 20.47½. Sterling on New York was steady at 4 85⅛. French francs closed with a slight rise at 122.45, and Italian lire, after touching 111⅜, concluded at 111½.

Silver, with both India and China selling, reached 26½d. per oz. Gold remained at the nominal price of 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3, 1925. Bankers' deposit rates at 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3½ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Jan. 21.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 12	5	5	Aldershot 5 p.c. max. C.	72—75	..	..
1322,992	,,	,,	4	4	Do. 4 p.c. Pref.	67—72	..	70
1,551,868	,,	Sept. 30	6½	6½	Alliance & Dublin Ord.	80—85	..	82—83½
374,000	,,	Jan. 13	4	4	Do. 4 p.c. Deb.	65—68*	..	..
800,000	1	Oct. 14	1/7½	1/7½	Bombay, Ltd.	1—1½	..	..
170,000	10	Aug. 26	8½	8½	Bournemouth 5 p.c.	12—13	..	..
500,050	10	,,	7	7	Do. B 7 p.c.	12—13	..	12⅝
975,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	11½
60,000	Stk.	Jan. 13	3	3	Do. 3 p.c. Deb.	53—56*	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	73—76*	..	75½
214,740	,,	Aug. 26	12	12	Brighton & Hove Orig.	163—168	..	166
744,200	,,	,,	9	9	Do. A Ord.	125—130	..	127
1,387,500	,,	July 22	5	5	Bristol 5 p.c. max.	84—85a	..	..
855,000	,,	Sept. 30	7	8	British Ord.	104—107	+1	106—106⅝
100,000	,,	Dec. 30	7	7	Do. 7 p.c. Pref.	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	68—73	..	68
100,000	10	Dec. 9	8	6	Cape Town, Ltd.	7—8	..	..
100,000	10	Oct. 28	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Dec. 30	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
626,860	,,	July 22	6	6	Cardiff Con. Ord.	97—100	..	..
237,860	,,	Dec. 30	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
157,150	,,	Aug. 12	6½	5	Chester 5 p.c. Ord.	89—94b	..	..
79,185	1	Sept. 30	†2/-	12/-	Colombo Ltd. Ord.	27/—29/-	..	..
24,495	1	,,	1/4½	1/4½	Colonial Gas Assn. Ld. Ord.	25/—27/-	..	..
321,490	1	Oct. 14	1/9⅜	1/7½	Do. 8 p.c. Pref.	21/—28/-	..	21/4½
173,900	1	,,	1/9⅜	1/7½	Commercial 4 p.c. Cap.	82—85	+1	83½—85
1,518,280	Stk.	Aug. 1	5½	5½	Do. 3½ p.c. Cap.	80—83	..	81½—82½
560,000	,,	,,	5/3/4	5/3/4	Do 3 p.c. Deb.	54—57	..	..
475,000	,,	Dec. 30	3	3	Continental Union, Ltd.	28—33	..	..
800,000	,,	Sept. 30	‡2	‡1	Do. 7 p.c. Pref.	82—85	..	..
200,000	,,	,,	7	7	Croydon sliding scale	96—99	..	98—99
737,150	,,	Aug. 12	6½	6½	Do. max. div.	78—81	..	..
403,100	,,	,,	5	5	Derby Con.	107—109e	..	..
492,270	,,	Aug. 26	9	8	Do. Deb.	73—75e	..	..
55,000	,,	Dec. 30	4	4	East Hull Ord. 5 p.c.	78—82	..	..
209,000	,,	Sept. 16	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
50,000	,,	Dec. 30	5	5	European, Ltd.	6½—7½	..	6½
1,002,180	10	Sept. 30	†4	†3	Gas Light & Coke 4 p.c. Ord.	86—88	..	86½—87⅜
18,788,960	Stk.	Aug. 12	4/17/4	5/1/4	Do. 3½ p.c. max.	59—62	..	..
2,600,000	,,	,,	3½	3½	Do. 4 p.c. Con. Pref.	75—78	..	76½—76⅞
4,157,020	,,	,,	4	4	Do. 3 p.c. Con. Deb.	58—61	+1	58½—59½
5,602,620	,,	Dec. 30	3	3	Do. 6 p.c. Br'tf'd Rd. Db.	100—105	..	102—102⅜
181,315	,,	,,	—	6	Do. 10 p.c. Bonds.	..	..	..
180,000	,,	,,	10	10	Do. 7½ p.c. Ilford Deb.	..	..	..
42,000	,,	—	7½	7½	Hastings & St L. 5 p.c. Conv	87—92	..	..
82,500	,,	Aug. 26	6½	6½	Do. 3½ p.c. Conv.	66—71	..	..
258,740	,,	,,	5½	5½	Hongkong & China, Ltd.	14½—15½	..	..
70,000	10	Oct. 14	†10	†10	Hornsey Con. 3½ p.c.	69—71	..	..
178,200	Stk.	Sept. 16	5	5	Imperial Continental Cap.	131—134	..	131½—132½
1,976,000	,,	Nov. 11	‡10	10	Do. 3½ p.c. Red. Deb.	68—71	..	..
226,170	,,	Aug. 12	3½	3½	Lea Bridge 5 p.c. Ord.	94—99	..	..
235,242	,,	Aug. 12	6½	6½	Liverpool 5 p.c. Ord.	79½—80½b	+½	..
2,127,340	,,	Aug. 12	5½	5½	Do. 7 p.c. Red. Pref.	102—105b	..	..
600,000	,,	Sept. 30	7	7	Maidstone 5 p.c. Cap.	112—117	..	..
165,736	,,	Aug. 26	8	9	Do. 3 p.c. Deb.	52—57	..	..
63,480	,,	Dec. 30	9	9	Malta & Mediterranean	5½—5⅝	..	..
75,000	5	Dec. 9	†7	†7	Montevideo, Ltd.	7⅞—8⅜	..	..
541,920	Stk.	Nov. 25	†6	†5	Newcastle & Gateshead Con.	70⅜—71½ d	..	..
2,061,315	,,	Aug. 12	5	5	Do. 4 p.c. Pref.	70—72d	..	..
360,929	,,	,,	4	4	Do. 3½ p.c. Deb.	67½—67⅝d	..	..
529,705	,,	Dec. 30	3½	3½	North Middlesex 10 p.c.	155—160	..	..
15,000	,,	Aug. 26	11½	11½	Do. 7 p.c.	109—114	..	..
91,590	,,	,,	8⅗	8⅗	Oriental, Ltd.	97—102	..	101—102
300,000	,,	Nov. 25	7	9	Plym'th & Ston'house 5 p.c.	105—110	..	..
188,120	,,	Dec. 30	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	102—107	..	..
414,500	,,	Aug. 26	—	7/4/0	Do. 5 p.c. max.	78—81	..	..
236,782	,,	,,	—	5/0/0	Primitiva Ord.	14/—15/-	..	14/—15/-
2,299,909	1	—	—	—	Do. 4 p.c. Red. Deb.	84—86	..	..
282,200	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb. 1911	71—73	+1	72—72½
600,000	Stk.	July 22	4	4	Do. 4 p.c. Cons. Deb.	69—71	..	..
434,963	,,	Dec. 30	—	4	San Paulo 6 p.c. Pref.	7½—8	..	..
150,000	10	Sept. 30	6	6	Do. 5 p.c. Red. Deb.	47—50	..	..
125,000	50	July 1	5	5	Sheffield A	96—98e	..	..
270,000	Stk.	Sept. 16	6	5⅜	Do. B	96—98e	..	..
419,968	,,	,,	6	5⅜	Do. C	96—98e	..	..
1,047,000	,,	,,	6	5½	South African	4—6	..	4
90,000	10	June 11	4	—	South Met. Ord.	94½—96½	+½	95—96
6,609,895	Stk.	Aug. 12	7	5	Do. 3 p.c. Deb.	57—60*	+1	58
1,295,445	,,	Jan. 13	3	3	Do. 6½ p.c. Red. Db.	100—102	..	..
734,000	,,	Sept. 16	6½	6½	South Shields Con.	114—116d	..	..
91,500	,,	Aug. 12	8½	8½	South Suburban Ord. 5 p.c.	97—100	..	98½—99½
1,187,795	,,	Aug. 12	6½	6½	Do. 5 p.c. Deb.	93—96	..	95½
868,837	,,	Dec. 30	5	5	South'mpton Ord. 5 p.c. max.	75—78	..	76½
647,740	,,	Oct. 14	5	5	Do. 4 p.c. Deb.	68—73	..	..
121,375	,,	Dec. 30	4	4	Swansea 7 p.c. Red. Pref.	100—102	..	101½
250,000	,,	Aug. 26	7	7	Do. 6½ p.c. Red. Deb.	100—102	..	..
200,000	,,	Dec. 30	6½	6½	Tottenham District A 5 p.c.	105—110	..	..
120,000	,,	July 22	7½	7½	Do. B 3½ p.c.	89—92	..	92
582,275	,,	,,	6½	6½	Do. 5½ p.c. Pref.	99—101	..	..
150,000	,,	,,	6½	6½	Do. 4 p.c. Deb.	72—75	..	..
181,365	,,	Dec. 9	4	4	Tynemouth Con. and New	69½—70½d	..	..
268,251	,,	Aug. 26	5	5	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90	..	..
197,294	,,	Aug. 26	6⅜	6½	Do. 5 p.c. pref.	82—87	+2	..
88,830	,,	,,	6	6	Do. 5 p.c. Maidenh'd	85—90	..	..
91,800	,,	,,	6⅜	6½	Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 8	8½	8½	Wandsworth A 5 p.c.	122—127	..	..
255,636	,,	,,	7	7	Do. B 3½ p.c.	102—107	..	..
419,450	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	..
332,000	,,	,,	6⅜	6⅜	Wimbledon 5 p.c.	98—103	..	..
58,000	,,	,,	7½	7½	Epsom 5 p.c.	104—109	..	..
88,416	,,	Dec. 30	3	3	3 p.c. Deb.	54—57	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. *Ex. div. † Paid free of income-tax. ‡ Plus 8½ p.ct. p.a. special dividend. § For year.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom & Ireland	Advance Rate:	35/-	18/-	10/-
	Credit Rate:	40/-	21/-	11/6
Dominions & Colonies & U.S.A. Payable in Advance		35/-	—	—
Other Countries in the Postal Union. Payable in Advance		40/-	22/6	12/6

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Central 6055.

Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the current Year are reminded that this can only be done before the end of January.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE, 34, OLD BROAD STREET, LONDON, E.C. 2.

OXIDE OF IRON
AS SUPPLIED BY THIS COMPANY FOR OVER 50 YEARS ON SALE OR LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.

Telegrams: "PURIFICATION STOCK, LONDON." *Telephone:* LONDON WALL, 9144.

PATENTS, Trade Marks, Inventions Advice, Handbook and Consultations free. KING'S PATENT AGENCY LTD., Director B. T. KING, C.I.M.E., Regd. Patent Agent, G.B., U.S., and Can., 146A, QUEEN VICTORIA ST., E.C. 4, and 6, QUALITY CT. (next Pat. Off.), LONDON, W.C. 40 years' refs. 'Phone Cent. 682.

WEIGHBRIDGES

FOR Motor Lorries and Railway Traffic can be seen erected at our works READY FOR DELIVERY. Inspection by your Engineer invited and a test by your Local Inspector of Weights and Measures before delivery. Every machine a High-Class Engineering Product and fully guaranteed.
CHARLES ROSS, LIMITED, SHEFFIELD.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD., 36, Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—ROYAL 1166.

GEORGE WILSON GAS METERS, Ltd for GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 268, Stockport Road, MANCHESTER.
Telephone: RUSHOLME 976. Telegrams: "GASMETER,"
and 46 & 47, Auckland Street, LONDON, S.E.11.
Telephone: HOP 647. Telegrams: "GASEOUS LAMB."

"LUX" PURIFYING MATERIAL.

THE PREMIER MATERIAL FOR GAS PURIFICATION.

THOS. DUXBURY AND CO.
SOLE AGENTS FOR ENGLAND, SCOTLAND, IRELAND, WALES AND THE COLONIES (except CANADA).

16, DEANSGATE, MANCHESTER. *Telegrams:* "Darwinian, Manchester." *Tel. Nos.:* 8808-9 City.

PALACE CHAMBERS, WESTMINSTER, S.W.1. *Telegrams:* "Darwinian, Parl, London." *Tel. No.:* 8878 Victoria.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.1.
WET AND DRY GAS METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815, Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.,
99, LONDON ROAD, LEICESTER.
Telegrams: "BRIPURIMAT, LEICESTER." Telephone: LEICESTER 5096.
Solicit enquiries for:—
NATURAL BRITISH PURIFYING MATERIAL,
NATURAL HYDRATED OXIDE OF IRON,
FIRST QUALITY DUTCH BOG ORE,
BEST QUALITY BELGIAN BOG ORE,
"PREPARED" AND "UNPREPARED" ARTIFICIAL OXIDES.
SPENT OXIDE PURCHASED.
LONDON OFFICE:
34/35, NORFOLK STREET, STRAND, W.C. 2.
Telegrams: "BRIPURIMAT ESTRAND LONDON." Telephone: CENTRAL 4545 & 4546.

LESLIE ALLAN & CO., LIMITED,
RAINFORD WORKS, RAINFORD, LANCS.
BUYERS OF
CRUDE TAR. Any quantity.
Co-operative Distillation Schemes.
Sliding Scale Contracts. Fixed Price Contracts.

J. E. C. LORD (Manchester), Ltd., Ship Canal Tar Works, Weaste, Manchester.
Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, &c.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR (SATURATORS), LTD., Chemical Plant Engineers, Blackhorse Street Mills, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 848.

HUTCHINSON BROTHERS, Ltd.,
FALCON WORKS, BARNSLEY.
MANUFACTURERS OF
GAS METERS (Ordinary and Slot).
"FALCON" INVERTED LAMPS,
SQUARE STREET LANTERNS,
SUPERHEATER BURNERS, and
CONVERSION SETS for Street Lanterns.

SULPHURIC ACID.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Burnley, are MAKERS of Special SULPHURIC ACID ("Eagle" Brand), for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Royal 1484.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Royal 1484.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
(*See* "*Gas Salesman*" (*December* 29), *p.* 290.)
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Royal 1484.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, HAS THE FIRST CALL ON YOUR CONSIDERATION.

NORTHERN COKE RESEARCH COMMITTEE.

APPLICATIONS are invited for the post of ASSISTANT CHEMIST under the above Committee at Armstrong College.
Applicants should have a Degree in Chemistry and some Research Experience, preferably, but not necessarily, in Coke.
Salary, £250 per Annum.
Three *copies* of the Application and Testimonials should be sent by the 7th February, to PROFESSOR BRISCOE, ARMSTRONG COLLEGE, NEWCASTLE-UPON-TYNE.

A GOOD Salesman Wanted for Sale of Gas Apparatus and to Assist in General Office. One with previous Experience preferred.
State Age and Salary required to the MANAGER, GAS COMPANY, SHEERNESS.

SHOWROOM MANAGER.

APPLICATIONS are invited for the Position of MANAGER of a New Showroom which will be opened in the Spring. They may be accompanied by relevant Testimonials. They must state fully Experience, Age, whether Married, present Occupation, Length of Notice required by present Employers, and the Salary required, and should be received by the undersigned not later than Monday, February 7 next, marked on the outside "Showroom Manager."
Applicants must have had Gas Undertaking Showroom Experience and be capable of Taking Full Charge of the Showroom, and of Advising Consumers adequately under the general guidance of the District Superintendent.
FRAS. C. BRIGGS, A.M.I.C.E., &c., Engineer and General Manager.
Town of Dudley
Gas Light Company,
Spring Gardens,
Dudley, Worcs.

GAS METER Makers having a Connection in Scotland require a REPRESENTATIVE on Commission.
Address No. 7707, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

CONTENTS.

EDITORIAL NOTES.

Considerations Affecting the Coming Maintenance Conference 243
A Remarkable Year for the Gas Light Company 244
The Top Place of High-Temperature Coke . 245
The Coke-Oven Gas Problem 245
The Fuel Chemist—Quenching Coke with Producer Gas—Flueless Houses 246
Coal Output—Leeds University Extensions—Export Coal Prices—Home Coal Prices—Unemployed 247

Personal 247
Obituary—Benjamin William Smith . . . 248
Electricity Supply Memoranda 248
Forthcoming Engagements 249
Quenching Coke with Producer Gas—A New Installation at Kiel 250
Gas Light and Coke Company—Annual Report and Accounts 251
Carbonizing Plant at Footscray—Glover-West Vertical Retorts 252
Fuel Relativities—Powdered and Solid Fuels. By Harald Nielsen 253
The Training of a Fuel Chemist. By Prof. J. W. Cobb, C.B.E. 256
Notes on New Books 256
A Clerical Short Cut—Gas Accounts and Rental Work 257
Atmospheric Nitrogen 257
Scottish Junior Gas Association (Eastern District)—
Visit to the Works of Messrs. R. Laidlaw & Son (Edin.), Ltd. 258
A Plea for Active Support. By D. Yule . 258

Modernity of Horizontal Retorting. By H. J. Toogood 259
Use of Coke Oven Gas for Town's Supply—Discussion opened by E. W. Smith, D.Sc., F.I.C. 263
Supplement—Maintenance Conference I.—VIII.

CORRESPONDENCE.

Steam-Engines for Exhausters 266
Confidence in Gas 266
Ignition of Oxide in Purifiers 266

REGISTER OF PATENTS.

Mantle Manufacture—Kilbourn, S., Martin, C. H., and Terrell, T. 267
Gasification of Pulverized Fuel—Szikla, G., and Rozinek, A. 267
Thermostat—Matthews, A. 267
Applications for Patents 267

MISCELLANEOUS NEWS.

South Metropolitan and South Suburban Gas Companies—Proposed Working Agreement 268
Inquiry at Skegness 268
Yorktown and Blackwater Gas Company . 268
Gas Regulation Act Orders 268
Gas Regulation Act Applications 268
Aldershot Gas, Water, and District Lighting Company—Report of Annual Shareholders' Meeting 269
Current Sales of Gas Products 270
Coal Trade Reports—
North-East Coast 271
Yorkshire and Lancashire 271
Midlands 271

MISCELLANEOUS NEWS—(*continued*).

Trade Notes 271
Contracts Open 271
Extensions 271
Stock Market Report 273

PARAGRAPHS.

Cornish Association of Gas Managers . . 247
Southern District (Kent Area) Gas Salesmen's Circle—Society of Engineers—Impregnating Silicic Acid Gel with Carbon—North of England Gas Managers' Association—Waterless Gasholders—Gas Making from Wood 255
Institution of Heating and Ventilating Engineers 256
Books Received 258
Radiation from Luminous Flames—The Optical Convention, 1926 262
Chemical Engineering Group—Levelling a Gasholder Tank—Modern Developments in Regard to Fuel 266
Compensation Case at Blackburn 268
Workmen's Annual Dinner at Reading—Accident at the Tottenham Gas-Works . 270
Reduction in Price at Harrogate—Tottenham Gas Dividends—Halifax Gas Examiner—Coke Oven Gas for Redcar 271
A Large Donation—North Middlesex Preference Stock Issue—Birmingham Section of British Industries Fair—Building Trades Exhibition at Leeds—Metropolitan Gas Company of Melbourne—Workshop Illumination—Stoke-on-Trent and Coke Oven Gas—Record Sales of Gas in America—Lighting Trades Staff Dinner and Dance—Fatal Gas Leak at Bury—London County Council and the Price of Gas 272

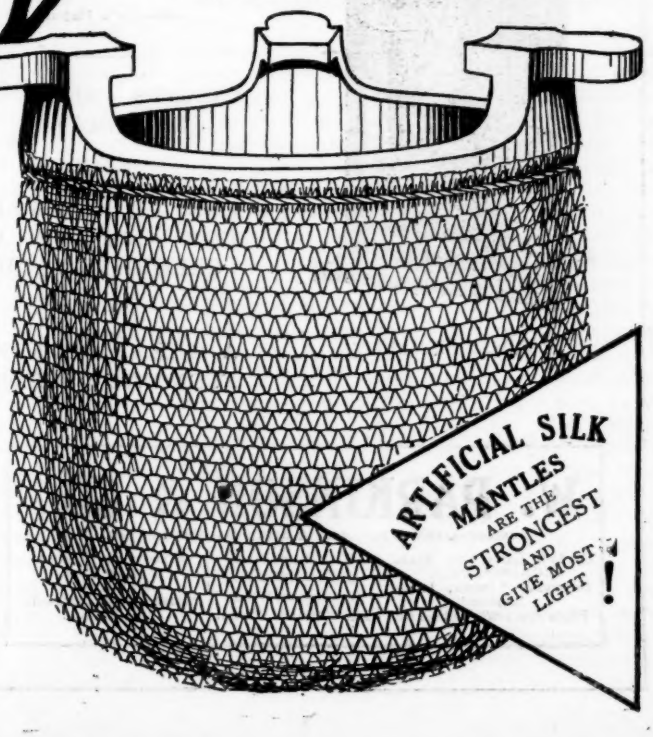
"JOURNAL" OFFICE TELEPHONE.

The "Journal" Office Telephone Number is "Central 6055."

For List of "JOURNAL" Advertisers, *see* p. 278.

The Still

ARTIFICIAL SILK
Inverted Incandescent
MANTLES
for
STREET LIGHTING
and
MAINTENANCE WORK.



BRITISH THROUGHOUT!

THE "STILL" MANTLE is made by W. M. Still & Sons, Ltd., NOT factored.

Write for Price List and Samples for Testing Purposes, also for Illustrated Folder: "A Word to the Lighting Engineer!" Mentioning Ref. A.L.G. 2.

W. M. STILL & SONS, Ltd.

24-31, Charles St., Hatton Garden, LONDON, E.C. 1.

Established 1874.

Mantle Works: Farm Road, Old Southgate, N. 14.

Improved

Service Cleanser

(Jones' Patent)

Thoroughly proved and reliable.

Highly effective in removing stoppages of all kinds, particularly where services are choked with naphthalene.

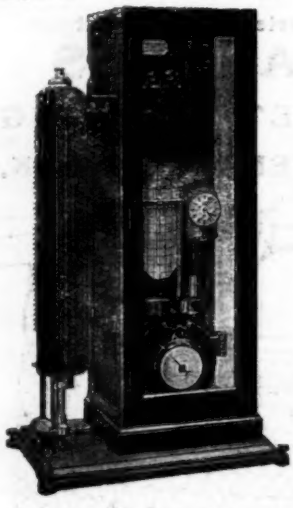
Light, compact, and easily portable

Prices on application.

ORIGINAL DRY METER MAKERS
ESTABLISHED IN 1844

THOMAS GLOVER & CO. LTD.
GOTHIC WORKS, ANGEL RD. EDMONTON, N.18

Branches at: BELFAST, BIRMINGHAM, BRISTOL, EDINBURGH, GLASGOW, MANCHESTER & NEWCASTLE-ON-TYNE



"GROSS" OR "NETT."

PARKINSON'S

IMPROVED

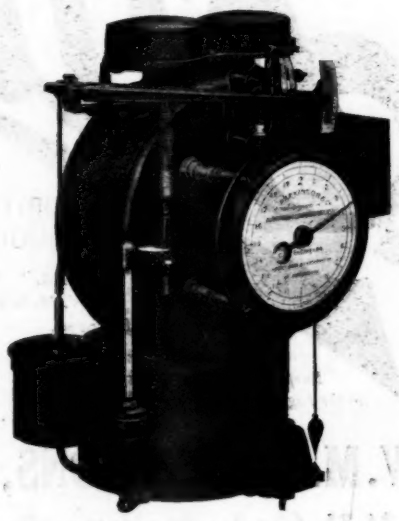
RECORDING CALORIMETER

(Beasley's Patents).

CHARTS NEED NO CORRECTION.

CAN BE SUPPLIED FOR GAS OF ANY CALORIFIC VALUE.

A GREAT BOON FOR *ECONOMIC WORKING.*



PATENT CONTROLLER, DEALING WITH
Density
Temperature
Barometric Pressure
(Can be supplied separately).

W. PARKINSON & CO.,

INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

COTTAGE LANE, CITY ROAD, LONDON, E.C.1.	BELL BARN ROAD, BIRMINGHAM.	MORNINGTON STREET, ORMEAU ROAD, BELFAST.
Telegrams: "INDEX, ISLING, LONDON."	"GASMETERS, B'HAM."	"PREPAYMENT, BELFAST."
'Phone Nos.: 4270 Clerkenwell	2245 Midland, B'ham.	8274 Belfast.